LONDON,
Printed for *Robert Pricke* against Aldermary Church in Bow lane, 169[illegible]

THE PREFACE.

THE Art of Perſpective, which hath the eye for its Principle, to whom Nature hath given more vivacity and more Perfections then to the other ſenſes, and which holdeth amongſt them the Rank, and the Advantages that the Soul hath above the Body, is likewiſe the faireſt and moſt delightful of all the Parts, that the Science of the Mathematicks hath put forth into light. This Science may well boaſt it ſelf to be the ſoul and the life of Painting, ſeeing that it is it which giveth unto Painters the Perfection of their Art, which in its ordering the heights and the meaſures of the Figures, the Moveables, the Architectures, and other Ornaments of a Picture: It inſtructeth what colours he ſhould uſe, lively or ſad, in what place he ought to apply the one and the other, what he ought to finiſh, and what ought not ſo to be: where one is to give a light, and where there is no need of it: in a word, it is this that ought to begin and finiſh, ſeeing that it ought to go throughout all. Without help, the beſt Maſter will make as many faults as draughts, principally in Architectures, wherewith they would enrich their Works, as I have ſeen in Pieces well eſteemed, where they have failed ſo foully, that this in part hath been the motive of my deſign, for to cauſe them to know their errours without naming them, and to teach the young ones to avoid them. How excellent a Painter ſoever one is, he muſt obſerve all theſe Rules, or he ſhall content none but Ignorants, and a Reaſonable Painter that ſhall know and uſe theſe well, ſhall do wonders to every ones content.

The Engraver in Copper ought not to be more ignorant of it then the Painter, seeing that he doth that with his Graver, which the other doth with his Pencil: It will make him to know that which he ought to touch roughly, and that which he ought to make faint. The need that he hath of this Science is so much the more necessary, as his Pieces are far more in number, then those of the Painter: the which if they be skilfully made, his praise is encreased: if on the contrary, his defects are thereby the more known, and every Piece is a Mouth which decrieth its Workman.

The Carver in Bos shall learn the height which he must give to his Statues, as well for below as for the midst, and in proportion to that which is higher, what Projector he must give to Buildings, and to other Bodies that have Mouldings or demi-Bos, the Angle for the point of the sight, for to take the heights and abridgements of all the Objects near and far off.

The Architect by this Science, may be able to give the understanding of his designes in a small space, he may also elevate one part, and leave the other in Plane, for to make his whole work appear; and seeing that we are upon Architecture, there needeth that the Perspective, (or he that professeth this,) be learned therein, at least in the Practice of the Hand, by reason that the fairest Pieces of Perspective are made in rich and sumptuous Buildings, framed according to the Orders of Columns, the Beauty of which dependeth on Proportions and Measures, which ought to be observed therein, otherwise they will offend the eye; wherefore they ought to be well studied, and whosoever knoweth them not when he ought to know them, is worthy of blame, seeing the easiness that he hath to learn them, having *Vitruvius*, *Vignola*, *Scamozzii*, and many other which have written thereof so pertinently.

It is not enough that he knows the Orders of Columns, he must understand all the Measures which are ordinarily given to Buildings, and to each particular thing, Gates, Windows, Chimneys, &c. and to place them well, and to take days fit for the purpose, that he make not any thing like one eye or maimed, to take great care that every thing be right, nothing faulty, and that the symmetry and proportion be kept, as much as one is able, otherwise the

the Perſpective, which is made for to content the ſight, would offend it by its defects.

Goldſmiths, Embroiderers, Makers of Tapiſtry, Painters, workers in Silver, in Silk, and in Wool; Joyners, and all others that buſie themſelves in making deſignes, and with Painting, cannot let paſs this Science, of Perſpective, if they would do any thing that may be commendable.

The moſt part of thoſe I have known to affect this Science, have aſſured me, that they have been beaten off by the great number of lines, that ſome Authors have ſet for to frame and finde the place of their Objects, Bodies, or Figures; others, by having met with too much obſcurity in their Orders and Explications, and particularly, for that they have not ſet the Inſtructions over against the Figures, and that whilſt that they turn over leaves to finde them, they forgat that which they deſired to know. All theſe Complaints oblige me to be more clear, and more Methodical in the Inſtructions which I have ſet before every figure, that they might have before them the Manner to ſet into Practice that which they deſire, applying my ſelf to their capacity, without giving ſuch Demonſtrations as would obſtruct or hinder them rather then clear them, uſing words which all may be able to underſtand, even in the Definitions, as one may ſee at the ſeventh fol. Having alſo given to certain things qualities which the common ſort give to them, though that in effect they have them not. As for example, at the 15th. fol. where *I* diſcourſe of the diſtance or removal far-off, *I* have been conſtrained to ſay, againſt my thought, that it is the Apple of the eye which receiveth the Rays of the Objects, as if they were bounded there, by reaſon that *I* have experimented that when *I* ſay that the Viſion is made upon the Retine, or fifth thin Membrane, at the bottom of the eye, that the Rays do but paſs by the Apple, and that the repreſen-

tation, or ſpecies of that which we behold are turned back; it ſeemeth to me that *I* ſpeak a new language, and that they cannot conceive that. Wherefore having conſidered that this knowledge did little import for the Practice of this Art: *I* gave to the Apple that which appertaineth to the bottom of the eye, which is the true place of the viſion or ſight, where the ſpecies of the Objects are framed although others ſay that it is in the Criſtalline: Thoſe which would be reſolved in this may look into *Aquilton Scheiner* and *des Cartes*, which have very well diſcourſed thereof.

Although *I* have uſed all diligence poſſible, for to render this Science very eaſie, yet *I* doubt not but many may finde trouble therein at the beginning; but he which ſhall be able to ſurmount the difficulties, which he ſhall finde at the firſt; there is nothing which he may not underſtand and practice, ſo that he be careful to underſtand well, and retain one Order, before that he turn over the leaf: becauſe that they are, as it were linked together, and dependent the one of the other: this little pains will give the ſatisfaction, by the eaſineſs which one ſhall have afterwards, in making all whatſoever he would.

It ſhall be known by the Table following, that this Book ſufficeth for to make all ſorts of Perſpectives, by uſing the orders, which the Figures and Letters ſhall ſhew, the which one may bring together to have that which one deſireth, in which he that would make ſome fair Perſpective, ſhall be delighted to find preſently that which he ſhall conceive will content his minde: and then he ſhall have far more delight then if he copied a Piece wholly made by another; and if one be conſtrained to imitate any one, this ſhall be done with facility, ſeeing that there are here orders, of all that poſſibly he can meet with. I confeſs freely that I have an incredible delight in making of new deſigns, and in inventing of new pieces which

which I would have publiſhed, as others have done, had it not been that my deſire is, that every one ſhould be partaker of this Recreation which he may take in compoſing them, & making them himſelf, having given him all the means, and the orders for to bring the ſame to paſs. But if any one will not take this as pains, he ſhall find many of them all made already in *Marolois*, *Uredeman*, *Urieſſe*, and others, which have taken delight to make their ingenuity appear therein.

So many, ſo fair, and excellent works have ſerved to make ſome Painters lazy, that they will not learn to make that which they found already made; they are content only to deſign thoſe the beſt that they are able, and as far as they underſtand them, the which would be tolerable, if they did imitate them well; but counterfeiting them without underſtanding, they make nothing that is good, giving ordinarily ſo many points in a Picture, as they ſhall meet with objects therein, lines and returns, they will make you ſee the under part of a thing, which as a certain one hath very well ſaid, ſteal from partieulars that which they give to the publick, to draw glory to themſelves from the labour of others.

I had rather ſay freely, that *I* intending to make this little Treatiſe of Perſpective; *I* would ſee, as far as I could, thoſe which had written thereof, and take from one and others, that which might ſerve for my ſubject, afterwards to make a General Reſtitution, with which *I* have mingled a little of mine own, for to bind them together, and to follow an Order, which they had forgot to keep. The firſt that *I* found to have given ſome light to this Science, is *George Reich*, an *High-Germane*, in the tenth Book of his Works: After him *Viator*, a Cannon of Toul, which hath given

given ſtore of good Figures, but too little Inſtructions. After him came *Albert Durer*, an excellent man, which hath left ſome Rules and Principles amongſt his Works in the fourth Book of his Geometry: *John Couſin* alſo hath made a Book thereof, wherein there are many good things. After thoſe came *Daniel Barbaro*, *Vignola*, *Serlio*, *du Cereau*, *Sirigary*, *Salomon de Caus*, *Maroleis*, *Uredement*, *Urieſſe*, *Guidus Ubaldus*, *Pietro*, *Acolti*, *le Sieur de Vauliza'd*, *le Sieur Deſargues*, and lately the Reverned *P. Niceron a Minime*, whom *I* have ſeen all, the one after the other, admiring their ſtudy and pains, for to ſerve the Publick, eſteeming my ſelf much honoured to imitate that which they done, and to be the unknown Copier of their Works, beſides thoſe which I have nam:d; there are many other brave ſpirits, which have written thereon, which I have not had the happineſs to ſee, becauſe I could not attain to it This Multitude of Authors cauſeth ſufficiently to underſtand, that this Science hath been in all times cheriſhed and eſteemed by the moſt curious ſpirits, and more in that age that we are in, then in any other paſs'd, the which maketh me to hope, that this little work will not diſpleaſe many, ſeeing that it bringeth Inſtructions, which have not been ſeen for ſetting into Perſpective, that which falleth ordinarily under the ſenſes, and by conſequence giveth the manner of making all ſorts of Perſpectives which any one can imagine.

I deſire to proceed to cauſe it to be ſeen, and to teach to ſet into Perſpective all that may be ſet into it, not only in Pieces level, and upon an united Plane, but alſo the bending, round and oblique, as for to paint within Roofs, frettings or rais'd Works, Corners and Turnings again, making to appear ſquare, or round, that which it ſhall not be. In one word, all the Rarities and Deceits of Perſpective, whereof theſe ought to come forth firſt, being the fuondations and principles of thoſe which muſt follow.

If

If I ſhall know that they may be pleaſing, and that they are look'd upon with a courteous eye, it ſhall be ſuch a contentment and ſatisfaction to me, as I hope not for, and which ſhall eaſily compel me to acquit my ſelf of my Promiſe.

A TABLE,

Instructing how to find the pieces that may serve to make any part of Perspective.

THe Art of Perspective ought to begin by the planes, and according to reason, by those that are the most easie, amongst the which the square, or the Cube, is the most easie, you may find how the plane thereof ought to be made, at the 19th. fol. and its elevation, at the 44th. and 49th. folios. If one would have it seen by the Angle, its plane is at the 20th fol. and its elevation at the 50th. fol.

For to elevate the Walls of an House, or Hedge-Rows for a Garden, you must take the 51th and 52th fol. and you shall find there, with the planes the manner of elevating them.

If those that would have the in-side of a Chamber, or of an Hall seen by the Front, shall find first the Walls, as we shall shew in the 51th and 52th fol. The Leaf following will give you the Doors, and the 54th fol. will shew how to make the Windows there. For to raise the Chimneys in what place soever you would, you must seek the 77th fol. After that you must lay there the Planchers; which may be found in the 55th and 57th fol? for the Pavements, there are of many sorts in the 31. 32. 33. and 34th. fol? If one would have open Doors, the 93th fol. will shew how to do it, and the Leaf following shall be for opening the Windows. When there shall be two or three Stories, or Chambers, the one above the other, you must always keep the same Orders; and there ought to be but one only point for the view, as you may see in the 76 fol. for to ascend into these Chambers there is an Ascent turning, or Stairs in the 82. 83. and 84 fol.

Ordinarily all the Buildings which are viewed by the inside are garnished with some Moveables, he that will place such there, shall find of all sorts in the 96th fol. and so forward unto the 103 fol. For the measures of such Figures, if any such are to be placed there, they are to be found in the 122th. or 125th fol.

For to make a Church appear by the inside, we must first resolve upon a plane, and place that in the Perspective, according to the two orders, that we have given there-

thereupon in the 37th or 41th fol. You muſt raiſe the Walls, as it is to be ſeen in the 51th fol. For the Windows, one may make them as the Arches of the 62th fol. or as in the 54th fol Except that there is no need of the croſs-bars, and that they muſt be round above. If one would have Pilaſters, or Pillers, they are to be found in the 48th fol. If one would have Columns there, he muſt take the Order for them from the 87th fol. After all that there muſt be made a bending Roof, or Roofs, if one would ſet it upon the ſides fol. 68. 69. 70. 71. and 72. will furniſh you with all ſorts thereof.

The Ridge or top of the Church is made after another manner then bending ſides, the Order for that may be found at the 74th fol. for to enrich it with Corniſhes, Mouldings and other Ornaments, you muſt have recourſe to the 88. 89. 90. 91. and 92. fol. for Altars, if one would have them there, you ſhall find the Method of making them in the 104 fol In the midſt of the croſs-bars of the Church one may make a Lanthorn or Cubeloe, as is to be ſeen in the 75. fol. The Pavement may be choſen in the 31. 32. 33. and 34 fol.

As for the Buildings without ſide of the Doors and Windows, they are made like the Buildings in the in-ſide, in the 53 and 54. fol. as may be ſeen in the 106. fol. When you ſhall have elevated them to the height that you think fit, you ſhall find the draught there to raiſe ſuch a kind of covering, as you ſhall think moſt fitting in the 107. or 108 fol. If one would have there any Corniſh, or other Ornaments, you may find how they ought to be placed in the fol. 88. 89. 90 91 and 92. Galleries Arch-wiſe, either for the out-ſide or in-ſide may be found in the fol. 63. 66 67. and 106. He that would make a whole ſtreet of Buildings, he muſt multiply the houſes, and place them on the one ſide, and on the other, as one may ſee in fol. 109. When one ſhall make houſes at a diſtance in the Perſpectives, and that they ſhall be parallel to the Horizon, you ought to allow them the ſingle draught only, without the thickneſs of the Doors or the Windows as I have made at the 110 fol. In the large open places, which are ordinarily in Streets in Perſpective, one may raiſe a Pyramide there, the 80 fol. will ſhew how to elevate it, upon ſteps, or any other figure, or Statue, upon a Piedeſtal, the 91 fol. will furniſh the Piedeſtal, and the 124. fol. will ſhew the figure.

When one would have Buildings ſeen by the left Angle he may take the planes of the fol 19. 30. and make the Elevations as he ſhall find them in the fol. 50. and 111. which ſhall give Orders, how to make the Doors and Windows there.

Gardens made in Perſpective do more delight the ſight then any thing in the World, as well for the colour, that is ſo pleaſing there, as for the variety of things, which may be ſet there. The planes are to be made, as in the fol. 35. 38. or 113.

In

In the which one may make ſuch diviſions, as one ſhall deſire. If we would have Bowers, the order therefore may be found in the 60 *and* 61. *fol. If one ſhould like better Hedges or Arbours, he may find them in the fol.* 51. *and* 52. *If inſtead of Bowers and Hedges, one would have a Wood, or Alleys of Trees, the* 112 *fol. will ſhew the Orders for divers ſorts. When one would make Fountains there, or ſpouts of Water, the Round of the* 29 *fol. may ſerve for a Baſon, its elevation is at the* 73 *fol. If one would have a ſquare, he muſt take the fol* 19 *or* 44. *For to have thereof with divers quarters he muſt ſeek in the* 45 *or* 46. *fol. where he may find Polygones. He that would ſet Statues, or Figures upon Piedeſtals, which is a very fair Ornament for a Garden, he muſt take their meaſures in the fol.* 122. *or* 125. *If one would place there any Caves or Grottes, the* 74 *fol. will ſhew him how they ought to be made.*

When one would make an Aſcent from one Garden to another, he ſhall find many ſorts of ſteps in the fol. 78 79 80. *and* 81. *Every one may chooſe amongſt all theſe things, that which ſhall pleaſe him beſt, and may put them all there into the ſame piece, and without confuſion, only he muſt keep the proportions and ſymmetryes which ought to be obſerved therein.*

If one would have Shops open, where there is nothing but the Walls, the 55 *fol. will ſhew: If one would that they ſhould be garniſhed with Boards or little Tables, he ſhall find the order thereof in the* 105 *fol. There is alſo another faſhion for a Shop, which is not in the front like this, and whereof the Opening is altogether different, one may ſee it in the* 95. *fol.*

Ample theatres were heretofore more in uſe in Pictures, then they are at preſent, which is the cauſe that I have not ſet any of them here, accounting them unuſeful here: If I ſhall know, that any one deſire them, I will ſet forth ſome, in the ſecond part in the mean time, if any one would raiſe up one thereof, he may uſe the plane, that is in fol 29. *in the which he muſt make a greater number of Circles, according to the number and bigneß, of the Stages, that he would have therein: For to raiſe the Stages, he muſt uſe the line of elevation, which he ſhall find in the* 75. *fol. As for Fortifications, he that would ſet them into Perſpective, ſhall find the Method to reduce and abreviate the plane thereof in the* 39 *fol. and how they ought to be elevated in fol.* 114.

The Treatiſe of Shadows, which beginneth at the 129. *fol. unto the* 150. *teacheth how to give them to all ſorts of Objects, whether they be cauſed by the Sun, by a Torch, or by the Candle.*

As for all other things in particular, they are to be found according to the Order of the Table which is at the end of the Book.

Licensed May 2. 1672.

Roger L'Estrange.

SOME

DEFINITIONS

AND

PRINCIPLES

OF

PERSPECTIVE.

A

The Definitions, Names and Terms of the Points, Lines and Figures which we shall use.

THe point hath not any parts, as we see A, in figure. 1. In Perspective, there are three sorts thereof, which are called, points of sight, points of distance, and points contingent or accidental.

The line, is a length without breadth, as A B in figure 2. The Perspective hath five principle ones, the which it always useth. The 1. The line of the base or plane, as C D may be in figure 3. The 2. The line Perpendicular, or Plomb-line, which falling upon another, maketh the Angles on the one part and another equal, and these Angles are called Right Angles, and the line is Perpendicular to that upon the which it falleth as in the figure 3. A B and E F, falling upon C D, do make the Angle right in G. The 3. are lines parallel, These are lines the which being continued upon the same plane, and prolonged on the one part and other infinitely, will never meet together. as N O. in the figure 6. The Horizontal line, is no other thing, then a parallel to the base, We shall speak of it more largely in his place. The 4. is the line Diagonal, this is a line drawn from one Angle to another, as K L in the figure 10. And the 5. The line occult or pointed, is a line which ought to be made in white, or with points, as O N in figure [illegible] and these lines never ought to appear, when the work is finished.

The right Angle is that which we speak of treating of Perpendiculars, I have set it apart by it self, that it may be better known what it is, by E F G, in figure 4.

There are two other Angles, under which are comprized all the Angles which are not right, the one is called the Obtuse which is more then right, as H L M, in figure 5. And the other sharp, which is less then right, as is H I K, in the same figure.

A term, is the end of any thing, as in the 2. A and B [illegible] are terms or the ends of the line.

A figure, is comprized by one or [illegible] by more terms, as in 7. 8. 9. 13. 14, *&c.* are figures.

The square, hath the four sides equal, and the four Angles right, A B C D, in fig. 7.

The Parallelogram, or long square, hath the four Angles right, but not the sides equal as C D E F, in fig 8.

The Triangle Equilateral, hath the three sides equal, as G H I in fig. 9.

Section and Intersection of lines, are two lines which do cross and divide themselves in one point, as in the figure 11, the lines A B and C D, divide themselves in E.

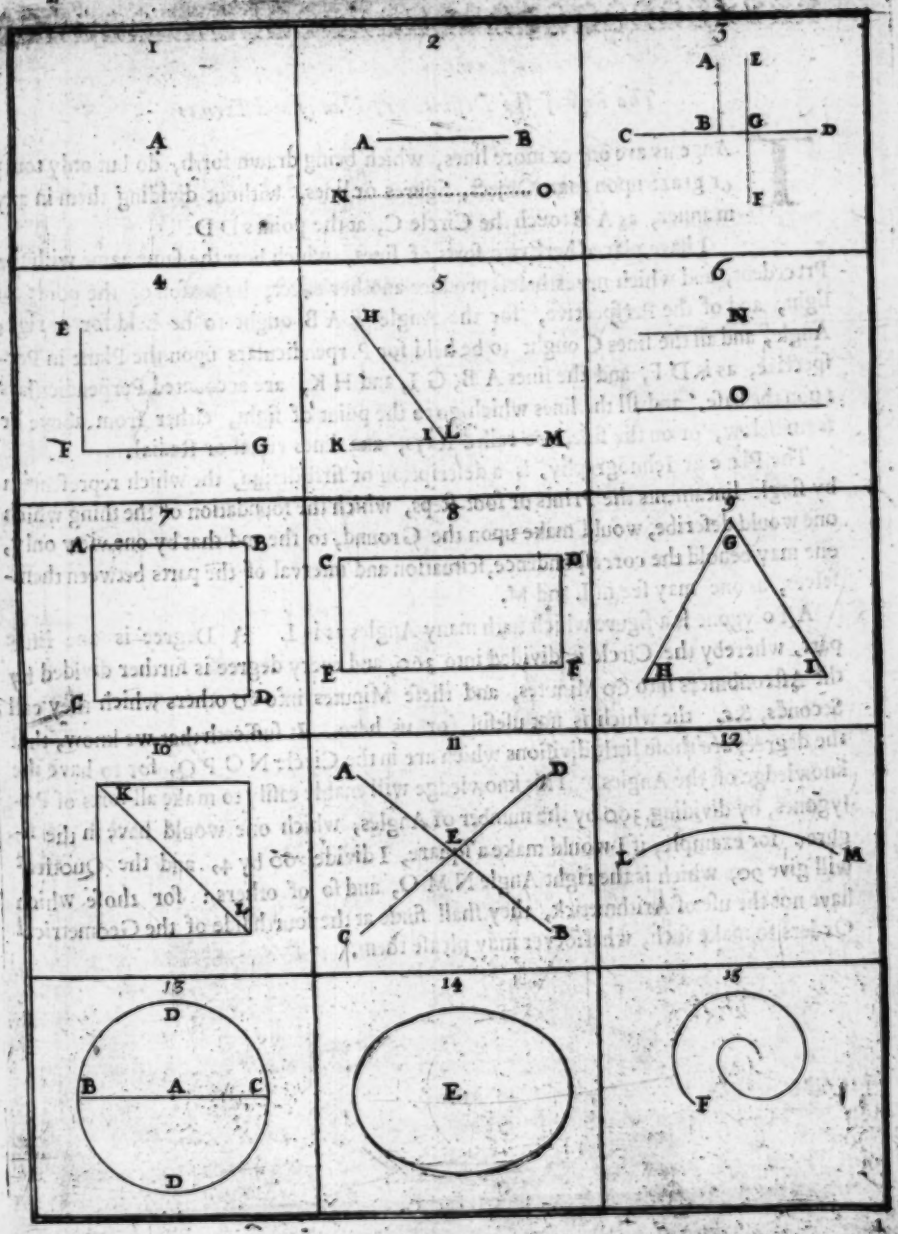
The bowed or crooked line, is that which is drawn by a Circuit from one point to another, as L M, in fig. 12

The Circle or Round, is a plane figure, comprized in one line only, called a circumference, towards which all the lines coming from the Center are equal between themselves, as B C D of the figure 13, the point of the midst of the Circle A, is called the Center

The Diameter, is the right line B C of the Circle, the which passing by the Center of the Circle A, divideth it into two equally

The Oval is a long figure, comprized within one line only, not Circular but bowed and Regular as E in fig. 14.

The Spiral or Volute, is a line, that is framed by two Centers, or by one only by Revolution or Diminution F, in fig. 15.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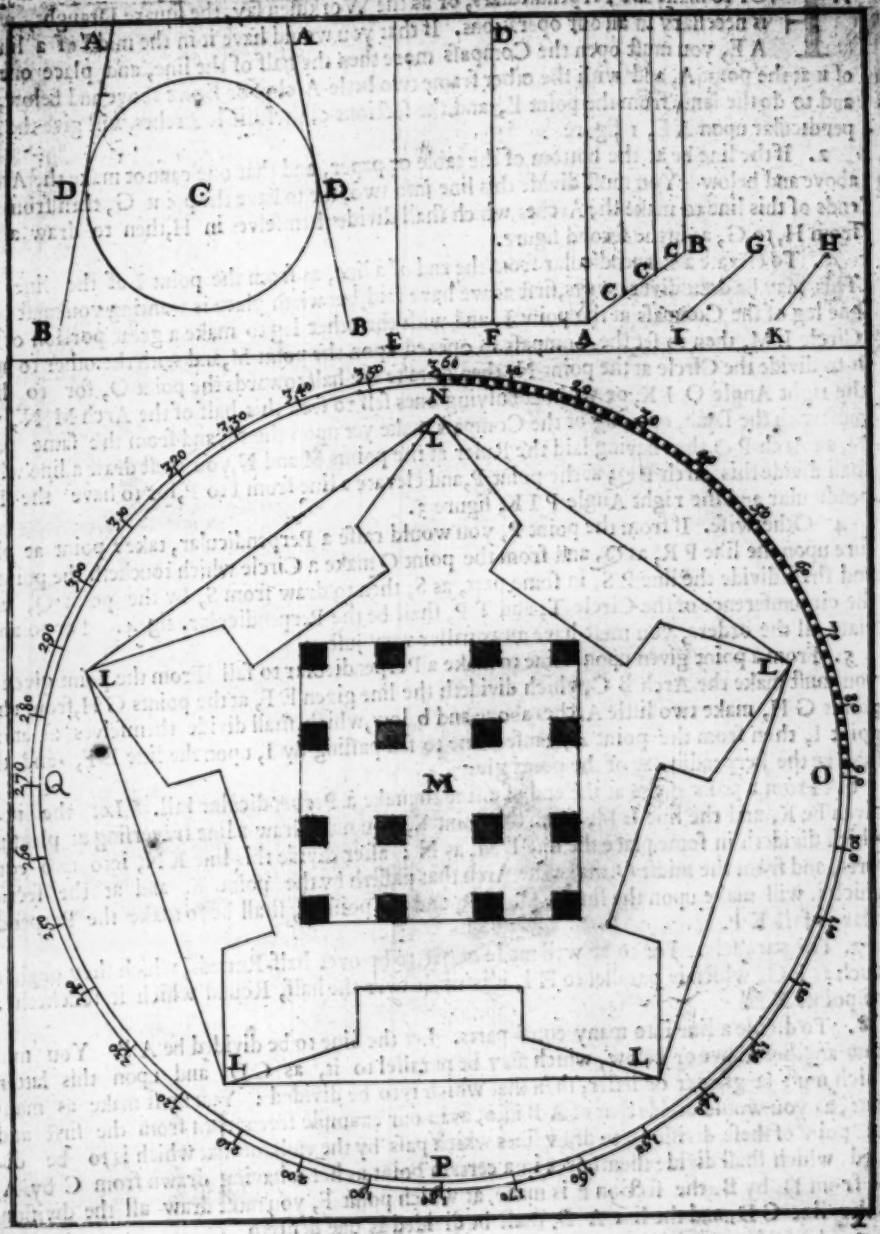
The Reſt of the Definitions, Names and Termes.

TAngents are one or more lines, which being drawn forth, do but only touch or graze upon ſome Object, figures or lines, without dividing them in any manner, as A B touch the Circle C, at the points D D.

I have placed here two ſorts of lines, which bear the ſame name with the Precedent, and which nevertheleſs produce another effect, by reaſon of the point of ſight, and of the Perſpective, for the Angle E A B ought to be held for a right Angle, and all the lines C ought to be held for Perpendiculars upon the Plane in Perſpective, as is D F, and the lines A B, G I, and H K, are accounted Perpendiculars upon the baſe, and all the lines which go to the point of ſight, either from above or from below, or on the ſide, are called Rays, and lines viſual or Radial.

The Plan or Ichnography, is a deſcription or firſt deſign, the which repreſenteth by ſingle lineaments the Prints or foot-ſteps, which the foundation of the thing which one would deſcribe, would make upon the Ground, to the end that by one view only, one may behold the correſpondence, ſcituation and interval of the parts between themſelves, as one may ſee in L and M.

A Polygone is a figure which hath many Angles as is L. A Degree is one little part, whereby the Circle is divided into 360, and every degree is further divided by the Aſtronomers into 60 Minutes, and theſe Minutes into 60 others which they call Seconds, &c. the which is not uſeful for us here. It ſufficeth that we know, that the degrees are thoſe little diviſions which are in the Circle N O P Q, for to have the knowledge of the Angles. This knowledge will enable eaſily to make all ſorts of Polygones, by dividing 360 by the number of Angles, which one would have in the figure: for example, if I would make a ſquare, I divide 360 by 4, and the Quotient will give 90, which is the right Angle N M O, and ſo of others: for thoſe which have not the uſe of Arithmetick, they ſhall finde at the fourth ſide of the Geometrical Orders to make ſuch, whatſoever may pleaſe them.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Some Orders of Geometry, for to make the Lines and Figures, which we are about to define.

1. FOr to make the Perpendiculars, or as the Workmen say, the square Draught, which is necessary in all our operations. If that you would have it in the midst of a line, as A E, you must open the Compass more then the half of the line, and place one leg of it at the point A, and with the other frame two little Arches or Bows above and below, as F and to do the same from the point E, and the sections of these little Arches, will give the Perpendicular upon A E, 1 figure.

2. If the line be at the bottom of the table or paper, and that one cannot make the Arches above and below. You must divide this line into two, for to have the point G, then from the ends of this line to make the Arches, which shall divide themselves in H, then to draw a line from H, to G, as in the second figure.

3. To elevate a Perpendicular from the end of a line, as from the point I of the line I K. This may be done divers ways, first as we have said, but when place is wanting you must place one leg of the Compass at the point I, and with the other leg to make a great portion of the Circle L M, then to set the Compass so opened upon the point M, and with the other to make it to divide the Circle at the point N, then to take the half towards the point O, for to have the right Angle O I K, or without busying ones self to seek this half of the Arch M N, you must with the same, opening of the Compass make yet upon the N, and from the same point N, an Arch P Q, then having laid the Ruler at the points M and N, you must draw a line which shall divide this Arch P Q, at the point P, and elevate a line from I to P, for to have the Perpendicular and the right Angle P I K, figure 3.

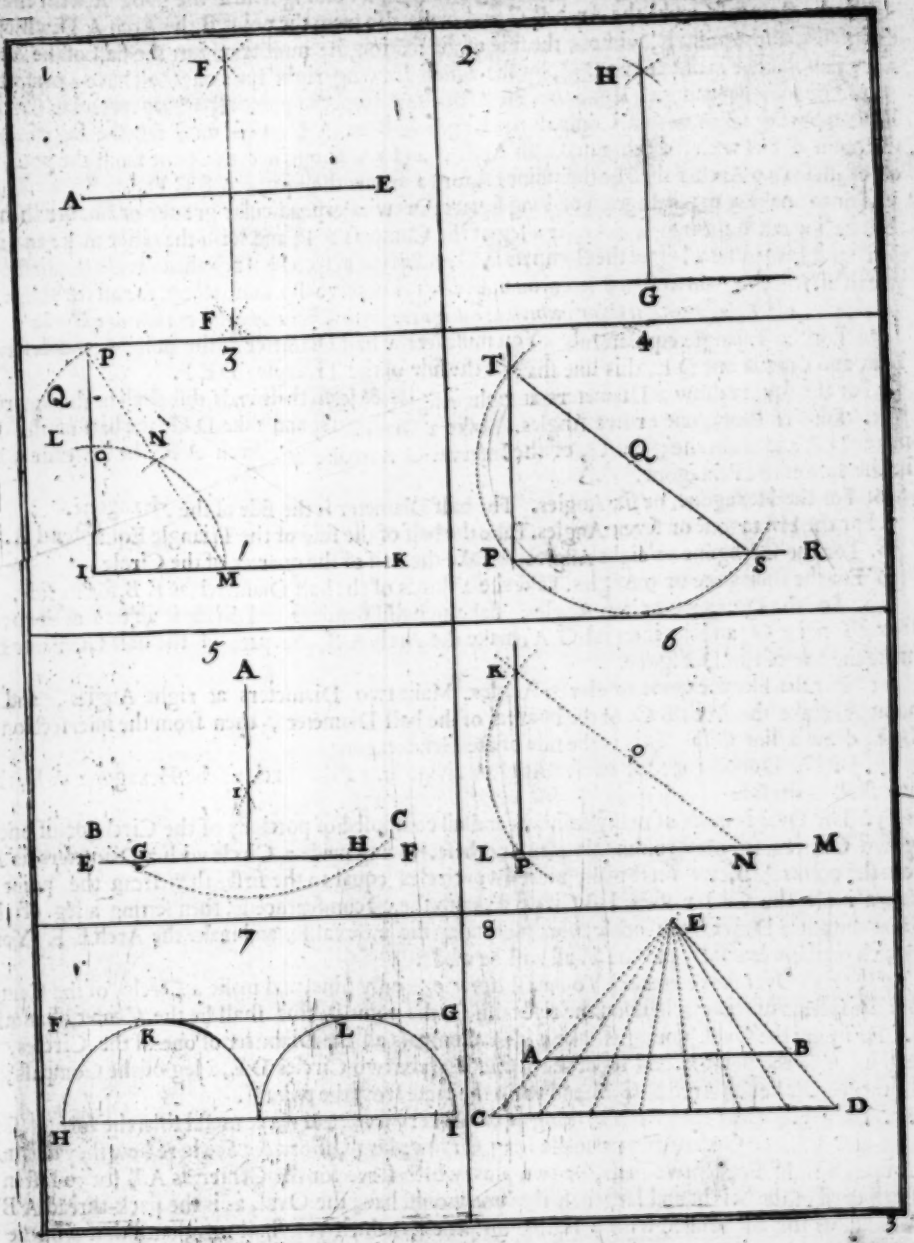
4 Otherwise. If from the point P, you would raise a Perpendicular, take a point at pleasure upon the line P R, as Q, and from the point Q make a Circle which toucheth the point P, and shall divide the line P S, in some part, as S, then to draw from S, by the point Q, unto the circumference of the Circle T, and T P, shall be the Perpendicular. fig. 4. For to abreviate all the orders, you must have an equaller very just.

5. From a point given upon a line to make a Perpendicular to fall From the point given A; you must make the Arch B C, which divideth the line given E F, at the points G H, from these points G H, make two little Arches above and below, which shall divide themselves as at the point I, then from the point A, cause a line to fall passing by I, upon the line E F, and that shall be the Perpendicular of the point given.

6. From a point given at the end of a line to make a Perpendicular fall. Let the point given be K, and the line L M, from the point K, you must draw a line traversing at pleasure, which divideth in some place the line L M, as N: after divide this line K N, into two equal parts, and from the midst O, make the Arch that passeth by the point K, and at the section which it will make upon the line L M, as P, and the point P, shall be to make the Perpendicular to fall K P.

7. The parallels. For to be well made ought to be over half-Rounds, which they ought to touch as F G, which is parallel to H I, it is made over the half, Round which it toucheth at the points K L.

8. To divide a line into many equal parts. Let the line to be divided be A B. You must draw another above or below, which may be parallel to it, as C D, and upon this latter, which must be greater or lesser, then that which is to be divided: You must make as many parts, as you would divide that of A B into, as in our example seven, then from the first and last point of these divisions, to draw lines which pass by the ends of that which is to be divided, which shall divide themselves in a certain point as here, having drawn from C by A, and from D, by B, the section E is made, at which point F, you must draw all the divisions of the line C D, and the line A B, shall be divided as one desireth.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1. IF the line A B, be given to make of it a square. You must set one Leg of the compass, at the point A, and with the other leg take the length A B, and holding firm at the point A, with the other leg of the Compass, make the Arch B C, and make also from the point B, the Arch A D, which shall divide themselves at the point E, without the side of the section, he must transport the half of the Arch A E, or B E, which shall be in the points D C, by the which drawing right lines one shall have a perfect square.

After another manner. Upon the line A B, draw from the point A, a Perpendicular C A, equal to A B, then having taken with a Compass the length A B or A C, you must set the leg of the Compass at the point B, and with the other make an Arch, and do altogether the same from the point C, the section of these two Arches shall be the point D, for to frame the square A B C D.

2. For to make a parallelogram or long square: Draw a Perpendicular greater or smaller then E F, as E G, then having taken the height E G, set a leg of the Compass at F, and with the other make an Arch, take also the length E F, and set a leg of the Compass in G, and make a second Arch then divide the first at H, and you shall have that which you desire, you must always observe the same thing, for all the four right Angles.

Of Polygones Circular, which are Figures with divers Angles within one Circle

3. For the Triangle equilateral. You must set the half Diameter at the point A, and describe the Arch D E, and draw a line D E, this line shall be the side of the Triangle, D E F.

4. For the square draw 2 Diameters at right Angles, & joyn their ends, this shall be the square A B C D.

5. For the Pentagone or five Angles. Make 2 Diameters, and take D G, the half of the Demy-Diameter D I, and from the point G, of the Interval G A, make the Arch A H, the subtendent H A, shall be the side of the Pentagone.

6 For the Hexagone, or six Angles. The half Diameter is the side of the Hexagone.

7. For the Heptagone or seven Angles. Take the half of the side of the Triangle Equilateral A.

8. For the Octogone or eight Angles Take the half of the quarter of the Circle.

9 For the Ennagone or 9 Angles. Take the 2 thirds of the half Diameter, as E B, for its side.

10. For the Decagone or ten Angles: Take an half Diameter and divide it in two at the point G, then from the point G, and the interval G A, make the Arch A B, the part of the half Diameter B C, shall make the side of the Decagone.

11 For the Hendecagone or eleven Angles. Make two Diameters at right Angles, and from the point A, make the Arch B C, of the interval of the half Diameter, then from the intersection C, unto the E, draw a line C D. This is the side of the Hendecagone.

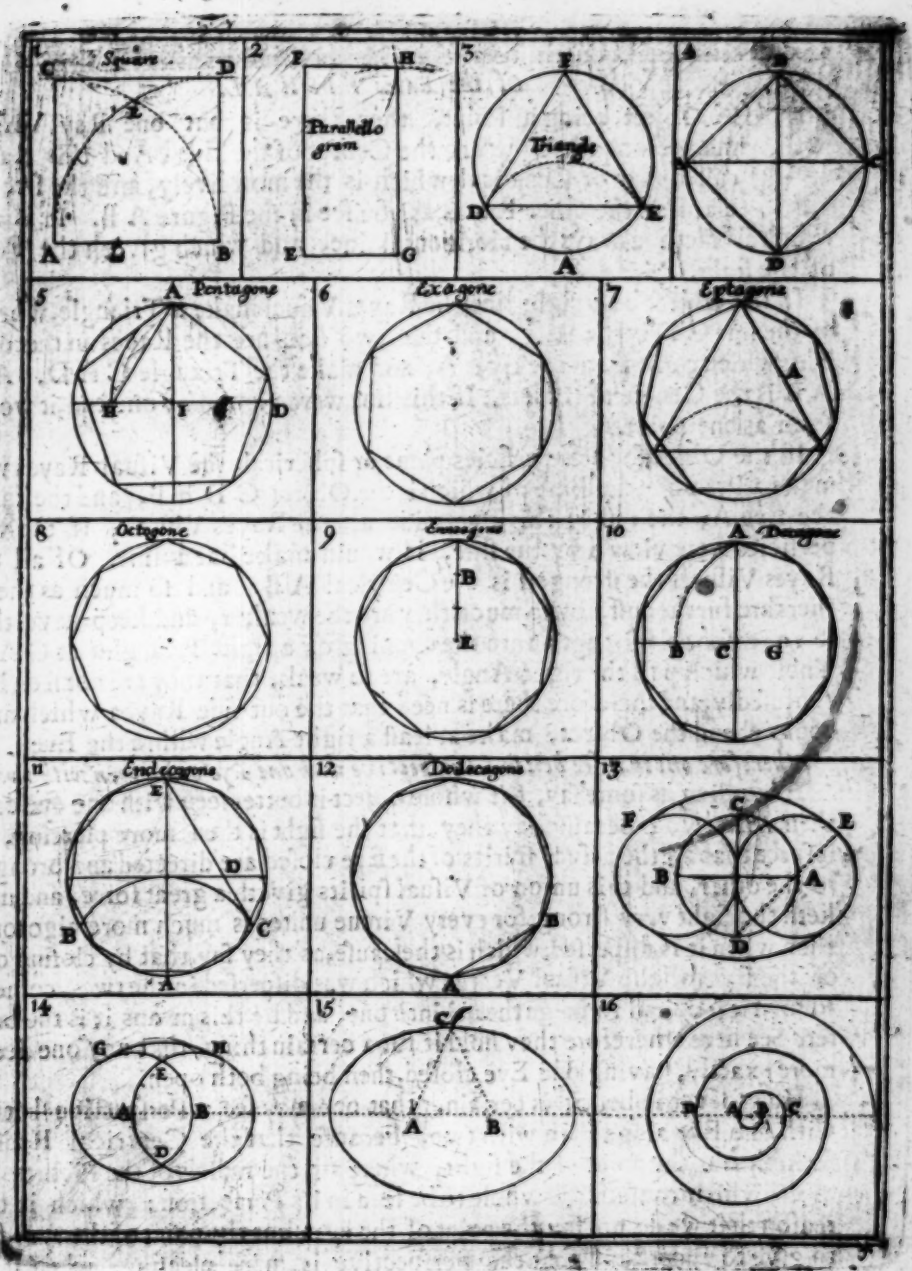
12. For the Dodecagone, or twelve Angles, divide into 2 the Arch of the Hexagone A B, the subtendent shall be the side

13. The Oval is made of many fashions and all composed of portions of the Circle, or of one only line by two Centers, the most commonly used are these. Having made a Circle with 2 Diameters, as A B C D, from the points A B, we must make more two circles equal to the first, then from the point D they draw a line by the Center of the last Circle A, unto the circumference E, then setting a leg of the Compass at the point D, with the other, you must take the interval E, and make the Arch E F. You must do as much on the other side, and the Wall will be made.

14 For an Oval more round. You must draw one only line, and make a Circle, of the Center A, and from the section of this circle upon the right line at the point B, this shall be the Center of another Circle. To frame the Oval, you must take with a Compass all the Diameter of one of the Circles, as from the point A to the point E, and set at the sections of the two Circles D E, a leg of the Compass, and with the other leg make the Arch D G H, and to do the same from the point E.

15. There is another manner of making of Ovals very easie, and more useful then the former, seeing that by one and the same Order, they be made long, narrow, large, short, &c See here how they are made. You must upon a right line set two nails, or two pins, which serve for the Center, as A B, for to fasten a thread or small cord of the height and largeness that you would have the Oval, as is the pack-thread A B C: you must hold this thread bended with a feather or pencil, which you shall turn, until that you be arrived where you have begun. If you would make it longer, lengthen out the Center, and do the contrary, if you would have it short: for if you set the two nails close one to the other, you shall have a Round.

16. For the Volute, or line like unto the Spiral, take two points upon one line, as A B, let these two points serve for a Center, the one after the other: for example, having made the half-round A B, set again the leg of the Compass on B, and with the other leg take the length A, and make an half-Circle A C. Then holding one leg of the Compass at A, you must take the distance A C, and make the half-Round C D, and so on as you please, changing only the Centers. *Vignola* giveth it another fashion.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Of the Rayes VISUAL.

THe Object being a Point, then there is but one Ray Visual made from the Object to the Center of the Eye; And this Ray is called Axe or Centrical; which is the most lively, and the strongest of all the other Rayes, as you see in the Figure A B. It is this which divideth always the Horizontal line, and which giveth the Point of the sight.

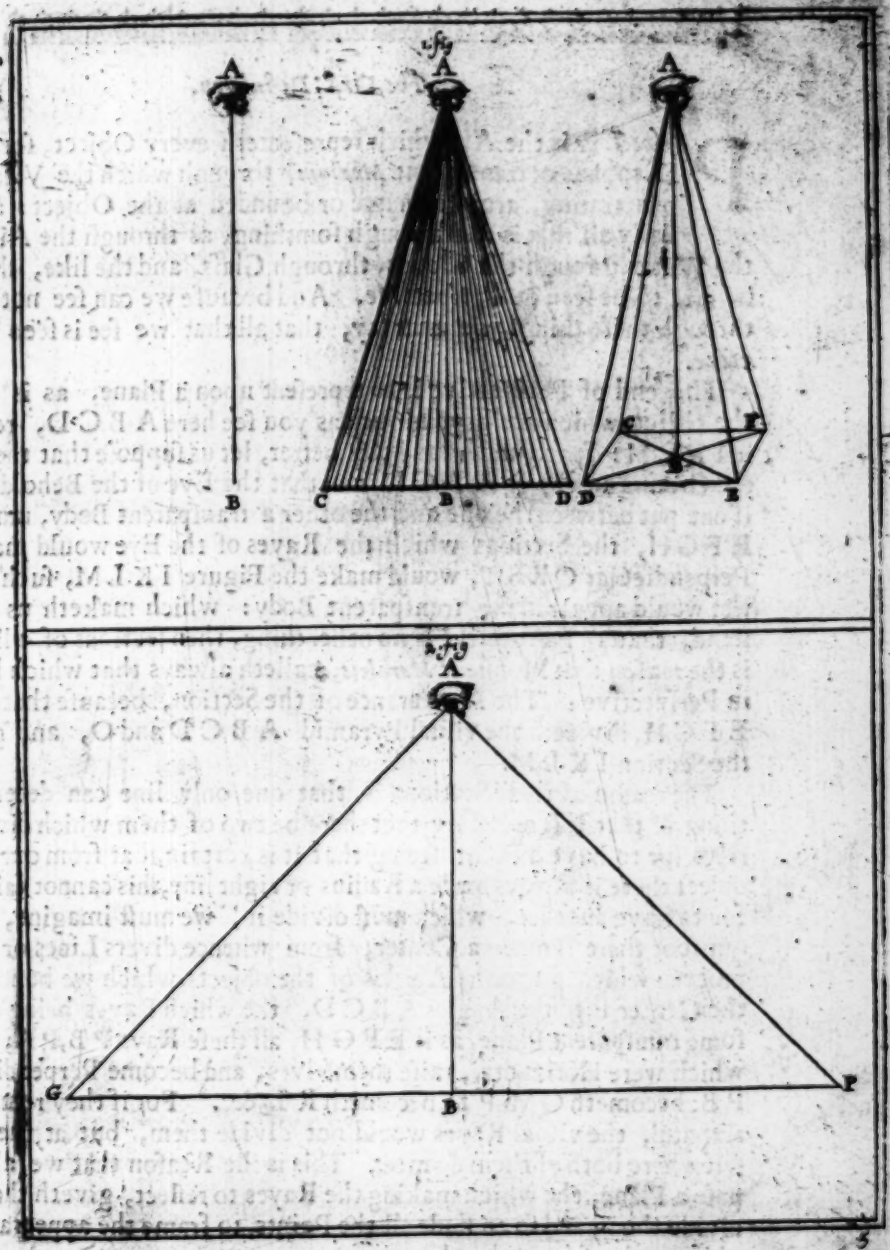
If the Object be a right line, the Rayes Visual make a Triangle, whereof the line C D is the Base, and the two sides are the Rayes on the outside, which come from the Eye A, and make the Triangle C A D. And A B is the Centrical Radius. If this line were viewed by one end, it would seem as one point.

If the Object be a Superficies plane or spherical, the Visual-Rayes will make a Pyramid, the Base of which is the Object C D E F, and the top is the Eye A, the rest of this Pyramide are the Rayes Visual; if the Superficies were view'd by the side, it would make but a line. Of all the Rayes Visuals the strongest is the Centrical A B: and so much as the others are further off, by so much they are the weaker, and keep nevertheless a reasonable strength unto the opening of a right Triangle, at G A P. Those which pass the right Angle, are so weak, that they are not seen but confusedly, and therefore there is need that the out-side Rayes which may comprehend the Object, make at least a right Angle within the Eye.

Wherefore one may see better a Perspective with one Eye only, then with two.

According as some say, the whole object is better seen with one eye only then with two; because, say they, that the sight is then more piercing, in respect that all the Visual spirits of the Eye closed are directed and brought to the other, and this union of Visual spirits giveth a great force, and maketh the sight very strong: for every Virtue united is much more vigorous, then when it is disperſed: which is the cause, as they say, that by closing one of the Eyes all the Visual Vertue which was disperſed in the two, cometh to joyn it self, and to be gathered into one, and by this means it is the better. See here wherefore they hold it for a certain thing, that any one seeth more exactly, having one Eye closed, then being both open.

Howsoever it be, it is certain, that one may see a Perspective better with one Eye alone then with two, because that the Centrical Radius seeketh out the point of the sight, where all the radials of the Picture do meet, which causeth the whole to be seen in its Perfection: which is the reason that we do not say the point of the eyes, but the point of the eye: for to give to understand that the Perspective is more pleasing, when it is viewed with one eye only.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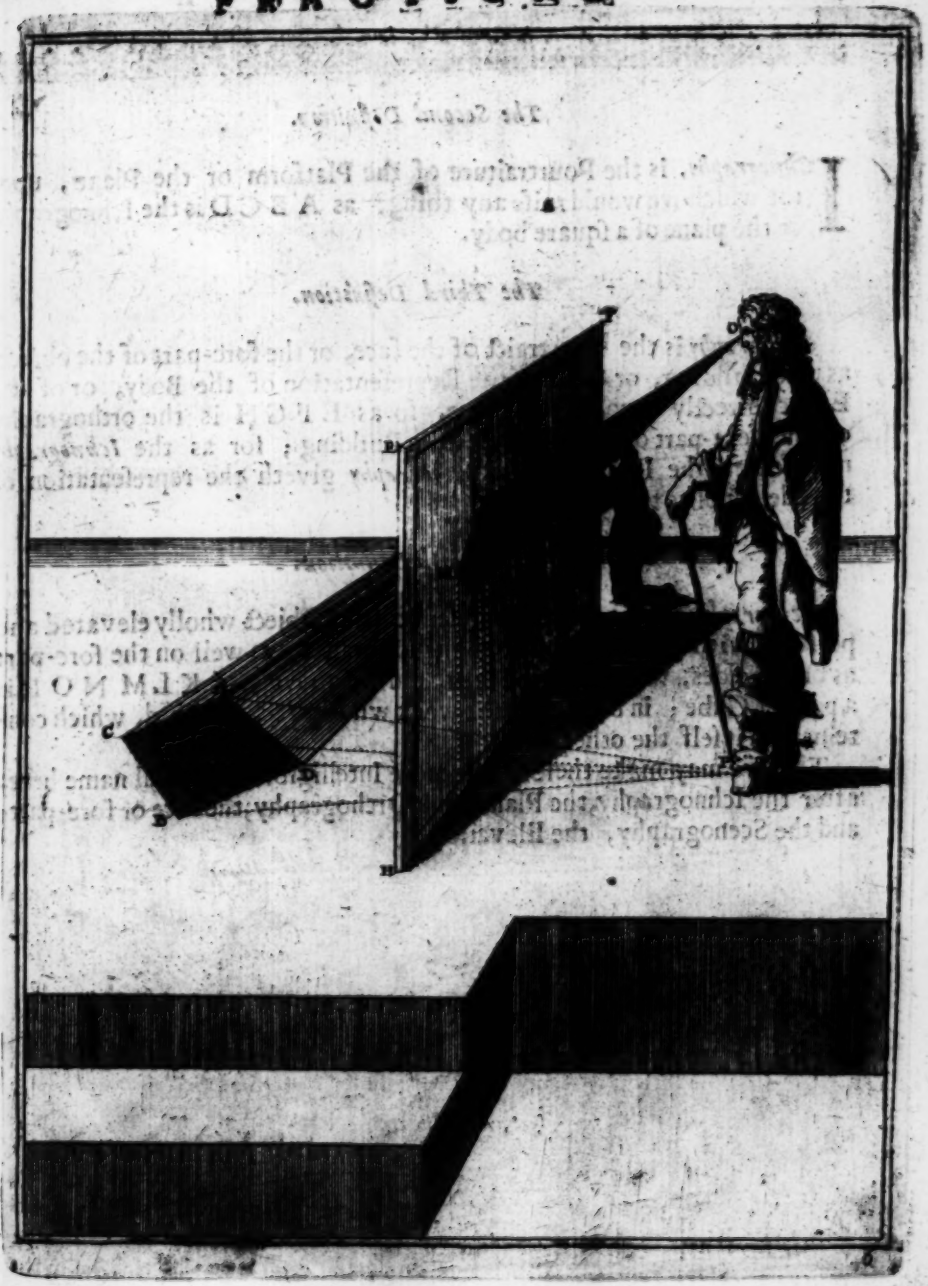
The First Definition.

Perspective is the Art which representeth every Object, seen by some Diaphane or transparent *Medium*, through which the Visual Rayes penetrating, are terminated or bounded at the Object: and generally all that is seen through something, as through the Air, through the Water, through the Clouds, through Glass, and the like, things may be said to be seen in Perspective. And because we can see nothing, but through these things, we must say, that all that we see is seen in Perspective.

The end of Perspective is to represent upon a Plane, as is E F G H, the objects which are beyond such as you see here A B C D, represented in I K L M: for to understand this better, let us suppose that there is upon the Ground an object A B C D, and that the Eye of the Beholder is in O, if one put between the one and the other a transparent Body, marked with E F G H, the Sections which the Rayes of the Eye would make of the Perpendicular Q R S T, would make the Figure I K L M, such as the object would appear in the transparent Body: which maketh us to understand, that all Perspective is no other thing, then sections of a line: This is the reason that Monsieur *Manolois*, calleth always that which he putteth in Perspective; The Appearance of the Section, because that the Plane E F G H, divideth the visual Pyramid A B C D and O, and giveth for the Section I K L M.

The reason of these Sections is, that one only line can determine nothing, & that it is necessary, that there be two of them which divide themselvs for to have a Point: seeing that it is certain, that from our eye to the object there is always made a Radius or right line, this cannot fail us: but for to have another, which must divide it, we must imagine, that from our foot there is made a Center, from whence divers Lines or Rayes do proceed which go to the Angles of the objects, which we behold as from the Center P to the Angles A B C D, the which Rayes being divided by some transparent Plane, as is E F G H, all these Rays P B, P A, P C, P D, which were Horizontal, raise themselves, and become Perpendiculars, as P B. becometh Q M. P D, becometh R L, &c. For if they remained Horizontal, the visual Rayes would not divide them; but at the object it self where both of them do meet. This is the Reason that we always suppose a Plane, the which making the Rayes to reflect, giveth the means to divide them, and so to finde all the Points, to frame the appearance of the objects what soever they be.



The Second Definition.

Ichnography, is the Pourtraiture of the Platform or the Plane, upon the which we would raiſe any thing, as A B C D is the Ichnography or the plane of a ſquare body.

The Third Definition.

Orthography is the Pourtraict of the face, or the fore-part of the object, as of a Building, or elſe it is the Repreſentation of the Body, or of the Edifice directly oppoſite to our eye, ſo as E F G H is the orthography or the fore-part of a Cube, or of a Building; for as the *Ichnography* repreſenteth the Plane, ſo the *Orthography* giveth the repreſentation of the ſide oppoſite to the Eye.

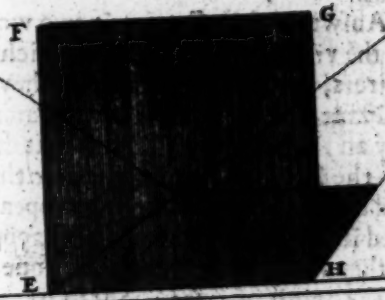
The fourth Definition.

Scenography, is that which repreſenteth the Object wholly elevated and perfect, with all its diminutions and umbrages, as well on the fore-part as on the ſides, which may be ſeen, and are above, as I K L M N O P, is a perfect Cube; in brief, it is the work wholly accompliſhed, which conteineth in it ſelf the other Parts.

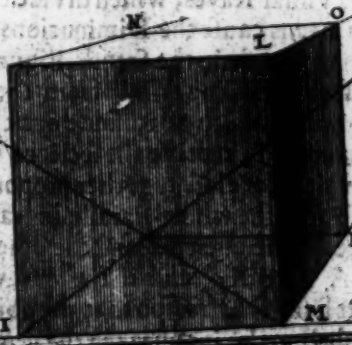
That we may make theſe words more Intelligible, we ſhall name hereafter the Ichnography, the Plane, the Orthography, the face or fore-part; and the Scenography, the Elevation.

1. fig.

2. fig



3. fig



Wherefore the Objects that are far distant seem to approach and joyn themselves together, although they be in equal distance.

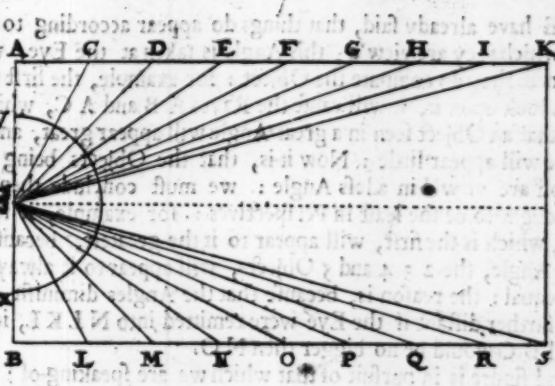
THis Figure will help to satisfie this question, which is difficult enough; let us suppose then, that some body hath his eye † at the midst of a line: it is evident, that if he would see the two Ends thereof A B, he must make an half-round V X, the center of which is the Eye, and the centrical Ray † T; and making this half-Circle, he discovereth the objects, which are on the one side and other in such manner, that it seemeth to him, that the farthest distant of the side A, seem to come near to the center T. And those on the side B go thither also, and seem as if they would joyn themselvs, as much as the one and the other side can.

If one ask why the things so distant, approach the one to the other, whether they be of the side either above or below us: for it seemeth, that that which is on our sides would joyn themselves, and that the planchers both above and below, do raise up and abase themselves the farther they are distant from us.

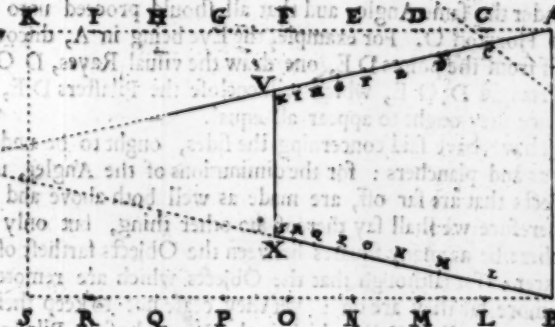
Behold the Answer and the Reason in two words: It is that all the objects appear, under the visual Angle, under the which they are seen: now it is that the columns, trees, or whatsoever objects they be, which are on the side A, the farthest distant will appear to draw towards the center T, because they are viewed by an Angle, or by a Radius that draweth thitherward; and as for example, the Ray † K, is much nearer the centrical T, then is † C, and † E, and by consequent it ought to appear so: and if the the objects were produced infinitely, they would still approach nearer to the centrical T, until that they would seem to make but one point, which would be infinite, as all the points of sight ought to be.

Now in Perspective the sides A K, B S, remain not Parallels, but are changed into visual Rayes, which divide themselves at the point of sight, and by this means cause the Diminutions of the body and sides of the objects. For example in the second Figure, the eye being in a distance capable of seeing the line A B, from the two Angles A B, two Rayes begin to be made, which go to finde out the point of sight T. And these Rayes A T and B T, receive the sections that the point of distance giveth to objects, which do close together proportionally, as we shall declare in its place, so that the whole Parallellogramne A K, B S, and all the objects that are on the one part and the other, come to be reduced to the little space A V, B X: and if the eye were farther distant, this space would be yet lesser, by reason that the objects, view'd afar off, seem very small, as I shall make it appear in the next leaf.

1. Fig.



2. Fig.



Wherefore the Objects draw near to each other, being view'd afar off.

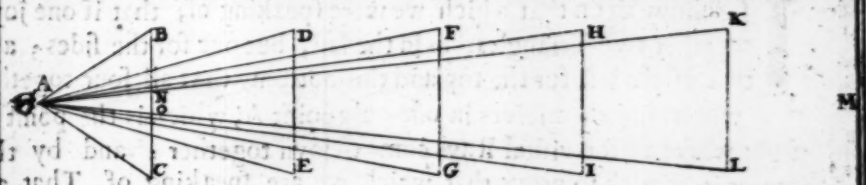
WE have already ſaid, that things do appear according to the Angle, in the which they are view'd; this Angle is taken at the Eye, where the lines do meet that do compute the Object: for example, the firſt Object being B C, if the Eye A look upon it, it will cauſe the Rayes A B and A C, which give the Angle B A C: ſo that an Object ſeen in a great Angle will appear great, and another ſeen in a little Angle will appear little: Now it is, that the Objects being equal, thoſe that are fartheſt off are view'd in a leſs Angle: we muſt conclude then, that the Objects fartheſt off, ought to be the leaſt in Perſpectives: for example, if the Eye be in A the Object B C, which is the firſt, will appear to it the greateſt, becauſe that it is viewed by a greater Angle, the 2 3 4 and 5 Objects, will appear to it always the leſs, although that they be equal: the reaſon is, becauſe that the Angles diminiſh; according as the Objects are farther diſtant if the Eye were remitted into N L K L, it would appear the greateſt, and B C would be no bigger then N O.

This ſecond figure is in purſuit of that which we are ſpeaking of: for ſuppoſing, that the Objects appear ſuch, as is the Angle within which they are viewed; it followeth thence, that if one draw many lines under one and the ſame Triangle, that they ought to appear equal amongſt themſelves: ſo we ſay, that all the lines which are compriſed between the lines of the Triangle N O P, will appear equal amongſt themſelves. Now ſeeing that all the Objects compriſed by the ſame Angle ſeem equal, thoſe which ſhall be compriſed by a greater Angle will ſeem greater, and thoſe that ſhall be compriſed by a leſs Angle will ſeem leſs.

Suppoſing that which we have ſaid, if there were a quantity of Columns or Pilaſters of one ſide and the other in an Hall, it would be of neceſſity that the Objects ſhould be under the ſame Angle, and that all ſhould proceed unto one point, which is within the Horizon O. For example, the Eye being in A, diſcovering the firſt Object D E if from the points D E, one draw the viſual Rayes, D O, E O, they will make the Triangle D O E, which will encloſe the Pilaſters D E, F G, H I, K L, M N, whence they ought to appear all equal.

That which we have ſaid concerning the ſides, ought to be underſtood likewiſe of the pavements and planchers: for the diminutions of the Angles, under the which we ſee the Objects that are far off, are made as well both above and under us as on the ſides. Wherefore we ſhall ſay thereof no other thing, but only that we muſt obſerve that there be as many ſquares between the Objects fartheſt off, as between thoſe that are nearer: for although that the Objects which are remoteſt do cloſe themſelves, the more far they are off: yet they ceaſe not to keep their ſaid diſtance, as we may ſee between B C D E, which is the Interval of the Pilaſters, there are ſixteen ſquares. There are alſo ſixteen between the moſt diſtant K L M N.

1. Fig



2. Fig.

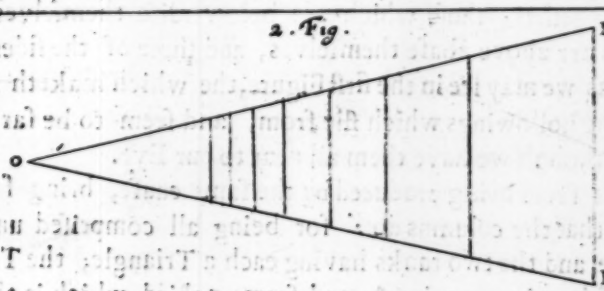


Fig 3

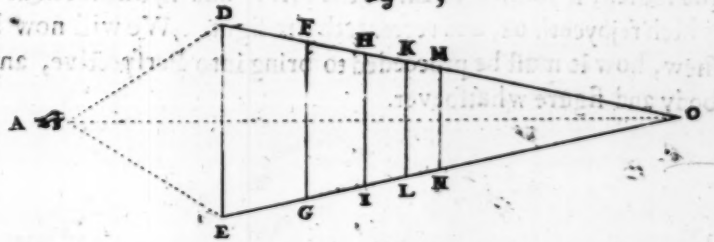
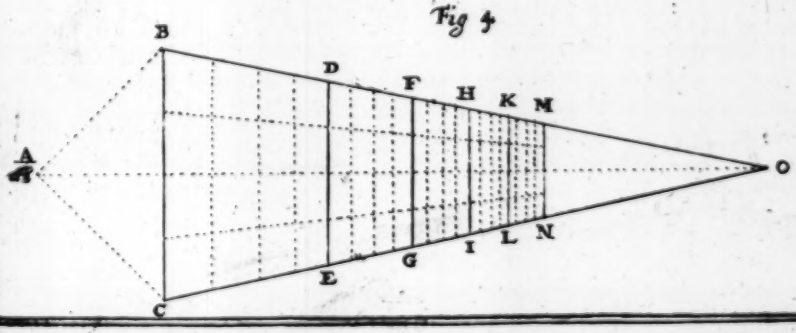
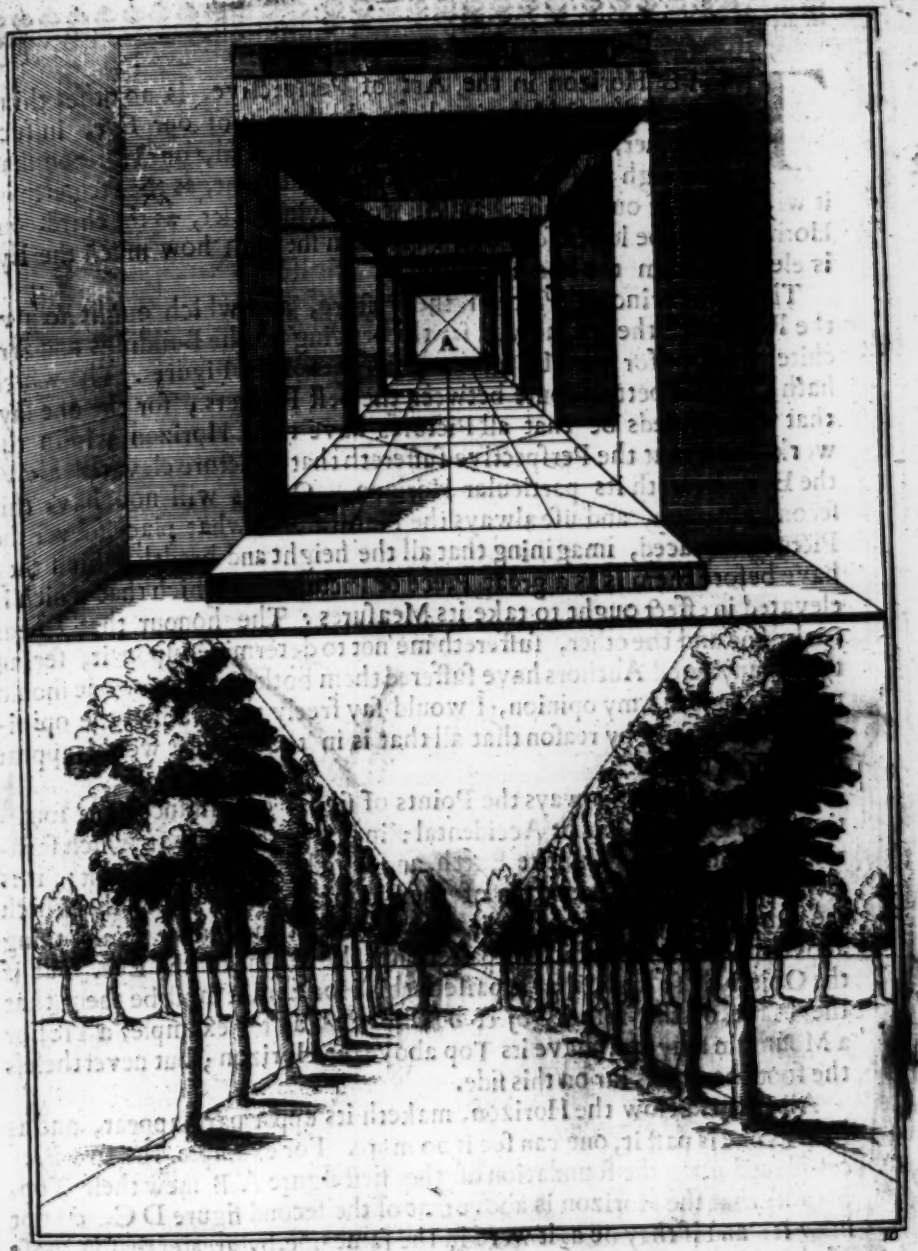


Fig 4



IT followeth on that which we were ſpeaking of, that if one joyn together two Triangles, as in the laſt, but one for the ſides; and two of the laſt for the top and the bottom, that all four together will bound themſelves in one only point A, which is the point of ſight where all the viſual Rays come to joyn together; and by this means it cometh to prove that which we are ſpeaking of, That according to the meaſure of the diſtance of the Objects, they come to cloſe together; thoſe which are below raiſe themſelves, and thoſe which are above abaſe themſelves, and thoſe of the ſides cloſe themſelvs, as we may ſee in the firſt Figure, the which maketh us ſee by the Eye the hollowings which flie from, and ſeem to be far diſtant from us, although we have them all near to our Eye.

The Trees being produced by the ſame cauſe, bring forth the ſame effect that the columns do: for being all compriſed under the ſame Angle, and the two ranks having each a Triangle, the Triangles joyn themſelves in one point A, and frame a third, which is the Earth; and the fourth, if you will, ſhall be the Air: and ſo affordeth us a delight which rejoyceth us, and recreateth the ſight. We will now begin to ſhew, how it muſt be proceeded to bring into Perſpective, any plane, body and figure whatſoever.


A

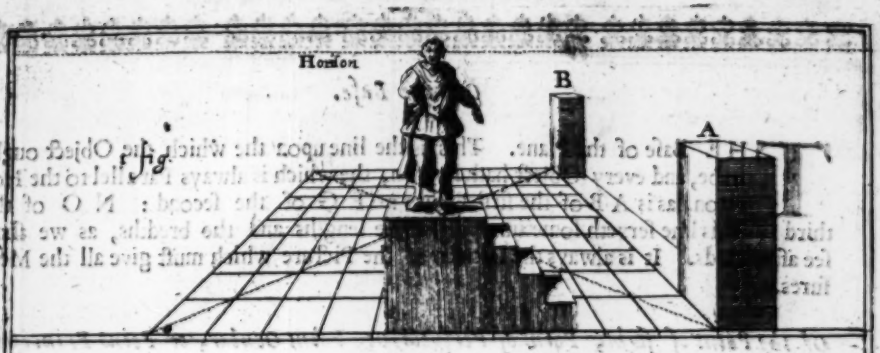
Of the Horizon.

THE Horizon in the Art of Perſpective, is no other thing then a line which giveth us the height of our Eye, in ſuch manner, as, if we be rais'd as the firſt man, our Horizon ſhall be high: if we be but of our own height, as the ſecond man: it will be but of our height: and if we be lying or ſet, as the third, our Horizon will be low: ſo that the Horizon ſheweth how much the Eye is elevated from the Earth.

This is the principal Piece of the Picture, and which ought to give the Rule to all the reſt, as well for the bending of the Buildings and Architectures, as for the Meaſures and heights of the Figures. The which hath cauſed a petty diſpute between the beſt Painters; for the one ſay, that it muſt needs be that all Pictures have their Horizon within the work, and that the Perſpective ſuffereth that a Picture elevated above the Eye, beareth its particular Horizon. Others will not have this ſecond Horizon, and uſe always the Natural, in what place ſoever the Picture be placed, imagining that all the height and bredth which they have before them is as a great Piece or Picture, of which that which is elevated in effect ought to take its Meaſures: The honour that I bear to the one and the other, ſuffereth me not to determine upon it, ſeeing that many good Authors have ſuffered them both. But if any one ſhould preſs me to ſpeak my opinion, I would ſay freely that I am of the opinion of the latter, by reaſon that all that is in the Picture would appear there more natural.

This line beareth always the Points of ſight, of diſtance, and ſometimes the Contingents or Accidental: in brief, this is that which ſeparateth the Heaven from the Earth, and which limiteth the ſight: it is always Parallel to the bottom of the Picture or Plane, upon the which the Object is placed: whence it appeareth, that one cannot ſet any thing above the Horizon, which ſurpaſſeth not the height of the Eye. But if the Object be ſo high, that it paſſeth this Horizon, it muſt be then, that the Plane of the ſame Object be above: as for example, a Tree or a Mountain may well have its Top above the Horizon; but nevertheleſs the foot thereof is far on this ſide.

All that is below the Horizon, maketh its upper part appear, and as ſoon as one is paſt it, one can ſee it no more. For example, the two Pieces placed upon the foundation of the firſt figure A B ſhew their Top, becauſe that the Horizon is above that of the ſecond figure D C, do not ſhew it: and if they be as it were in the ſame line, by greater reaſon, thoſe of the third E F ought leſs to ſhew it, ſeeing that they exceed it very much: they are nevertheleſs as high the one as the other, it is then the Horizon that cauſeth this difference.



1 fig.

2 fig.

3 fig.

Of the Base.

THE Base of the Plane. This is the line upon the which the Object ought to be, and every Object hath its own, the which is always Parallel to the Horizon, as is A B of the first Figure: F G of the second: N O of the third: This line serveth sometimes to give the lengths and the bredths, as we shall see afterwards. It is always the bottom of the Picture which must give all the Measures.

Of the Point of sight, Point of Perspective, Point Ocular, or Point Principal.

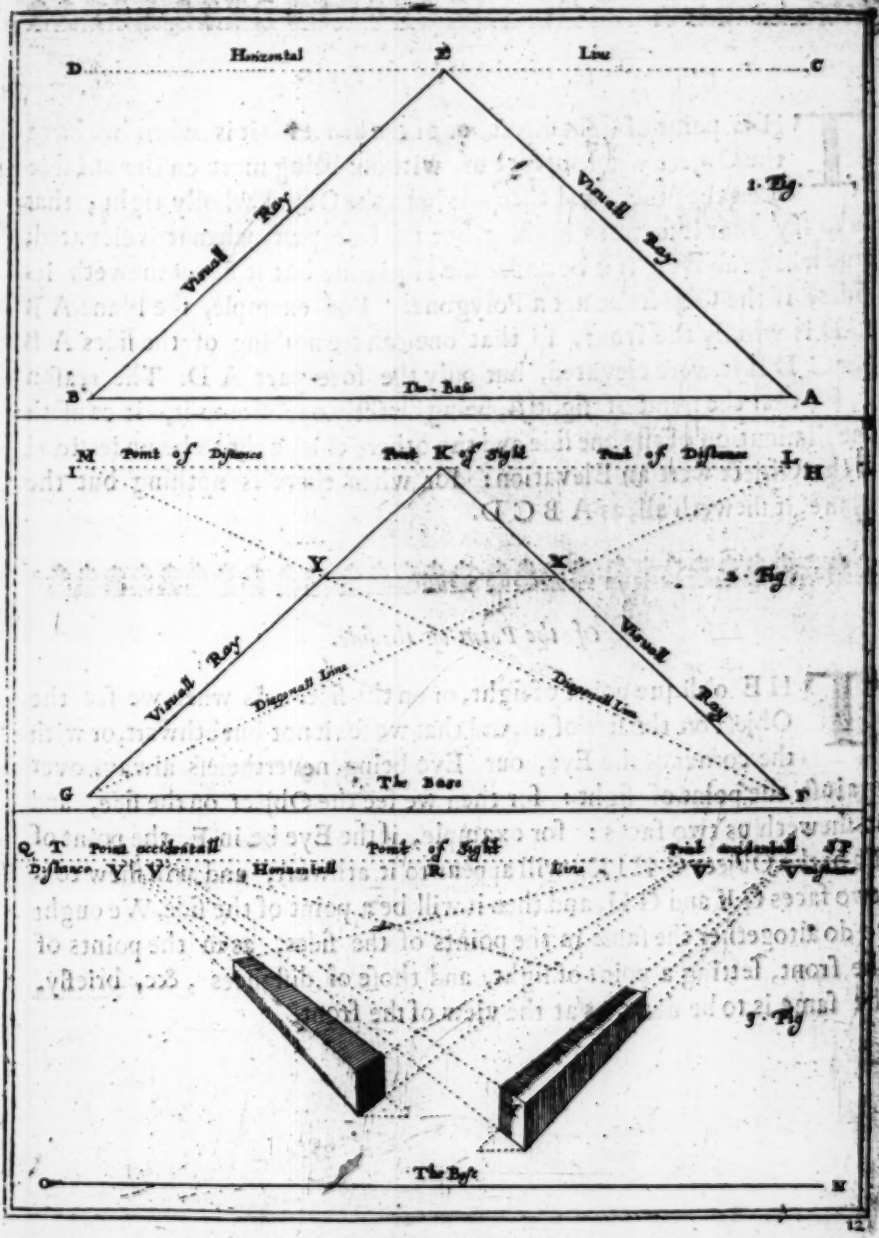
THE Point of Sight, of Perspective, Principal or Ocular. This is a Point which maketh the Axis of the Eye, or the Centrical Ray above the Horizontal line, as E of the first Figure is the point Ocular above the Horizon C D, at which all the lines or visual Rayes ought to joyn themselves: It is called also the point of the Eye, by reason that it is opposite to him which looketh upon it.

Of the Points of Distance.

THE Point of distance, or Points of distances. Is a point or points (for they make two, although it be not necessary) which are to be set equally distant from the point of sight: They call them points of distance: because that the Person must be as much distant from the Figure, or Picture, and from the base, as these points are distant from the Point Ocular, and they must always be within the horizontal line, as H I is the Horizon: K, the point of sight: L and M are the points of distance, which serve to afford all the Abridgements. As for example, if from the ends of the line E G, one draw two lines to the point K, and from the same points F G, one draw two lines to the points of distances M and L, where these two lines G L and F K shall be divided at the point X, and G K, and F M, at the point Y, this shall be the line of sinking or hollowing, and the abridgment of the square, whereof F G is a side and the base: the lines that go to the point of sight are all visual Rays, and those which go to the points of distance are Diagonals.

Of Points Accidental.

POints Contingent or Accidental. Are certain Points where the Objects do end, which may be cast negligently, and without order, under the Plane: it is because they are not drawn to the Point ocular, nor to the points of Distances: but by chance and at adventure, where they meet each other in the Horizon: as for example, these two pieces of wood X and Y, do make the points V, V, V, V, above the Horizon P and Q, and go not to the point of sight which is R, nor to the points of distance S and T: And sometimes the Bodies or Objects are so ill ordered, that one must make these points without the Horizon, as we shall cause to be seen in its place. They serve also for the Openings of doors, of windows, of stairs, and such like things. The which shall be seen hereafter.


D
Horizontal
E
Line
C
Visuall Ray
Visuall Ray
1. Fig.
B
The Base
A
M
Point of Distance
Point K of Sight
Point of Distance
L
I
H
Y
X
2. Fig.
Visuall Ray
Visuall Ray
Diagonall Line
Diagonall Line
G
The Base
F
Q T
Point accidentall
Point of Sight
Point accidentall
S P
Distance V V
Horizontall
R
Line
V
V Distance
3. Fig.
O
The Base
N

12

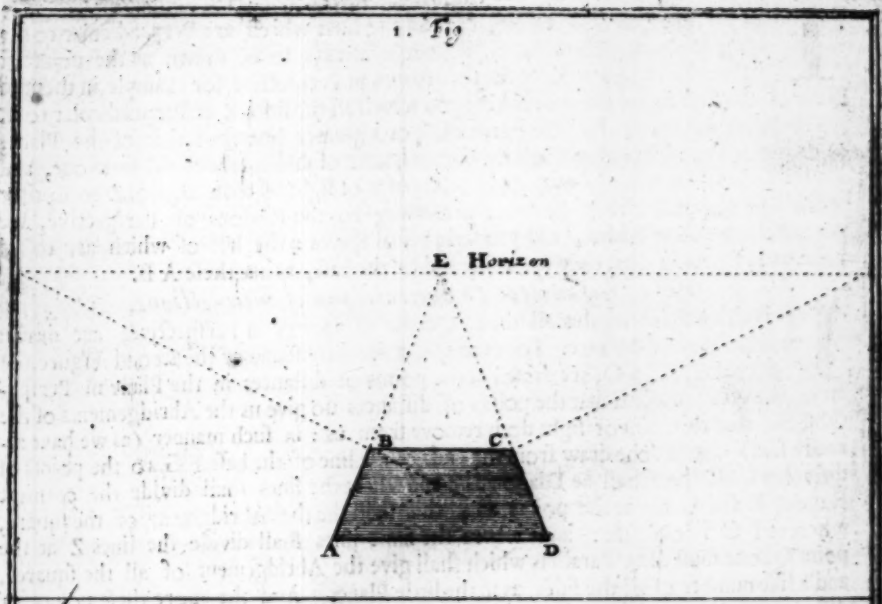
Of the Point of the Front.

THE point of ſight direct, or of the front; it is when we have the Object whole before us, without being more on the one ſide then the other, and then one hath the Object wholly right; that is to ſay, that it ſheweth nothing but the fore-part, when it is elevated, and a little above, if it be under the Horizon, but it never ſheweth its ſides, if the Objects be not a Polygone. For example, the Plane A B C D is wholly the front, ſo that one can ſee nothing of the ſides A B nor C D if it were elevated, but only the fore-part A D. The reaſon is, for that the point of ſight E, being directly oppoſite to it, it cauſeth the diminution of the one ſide and the other; this ought to be underſtood if the Object were an Elevation: for when there is nothing but the Plane, it ſheweth all, as A B C D.

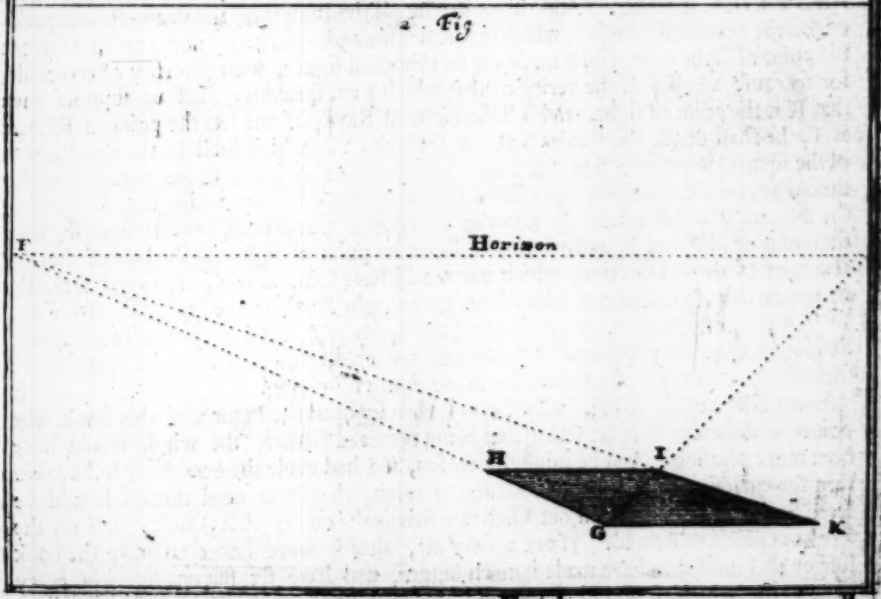
Of the Point of the ſide.

THE oblique point of ſight, or on the ſide: Is when we ſee the Object on the ſide of us, and that we ſee it not but athwart, or with the corner of the Eye, our Eye being nevertheleſs always over againſt the point of ſight: for then we ſee the Object on the ſide, and it ſheweth us two faces: for example, if the Eye be in F, the point of ſight the Object G H I K, will appear to it athwart, and will ſhew to it two faces G K and G H, and then it will be a point of the ſide. We ought to do altogether the ſame in the points of the ſides, as in the points of the front, ſetting a point of ſight, and thoſe of diſtances, &c. briefly, the ſame is to be done, as at the view of the front.

1. Fig



2. Fig



D 17.

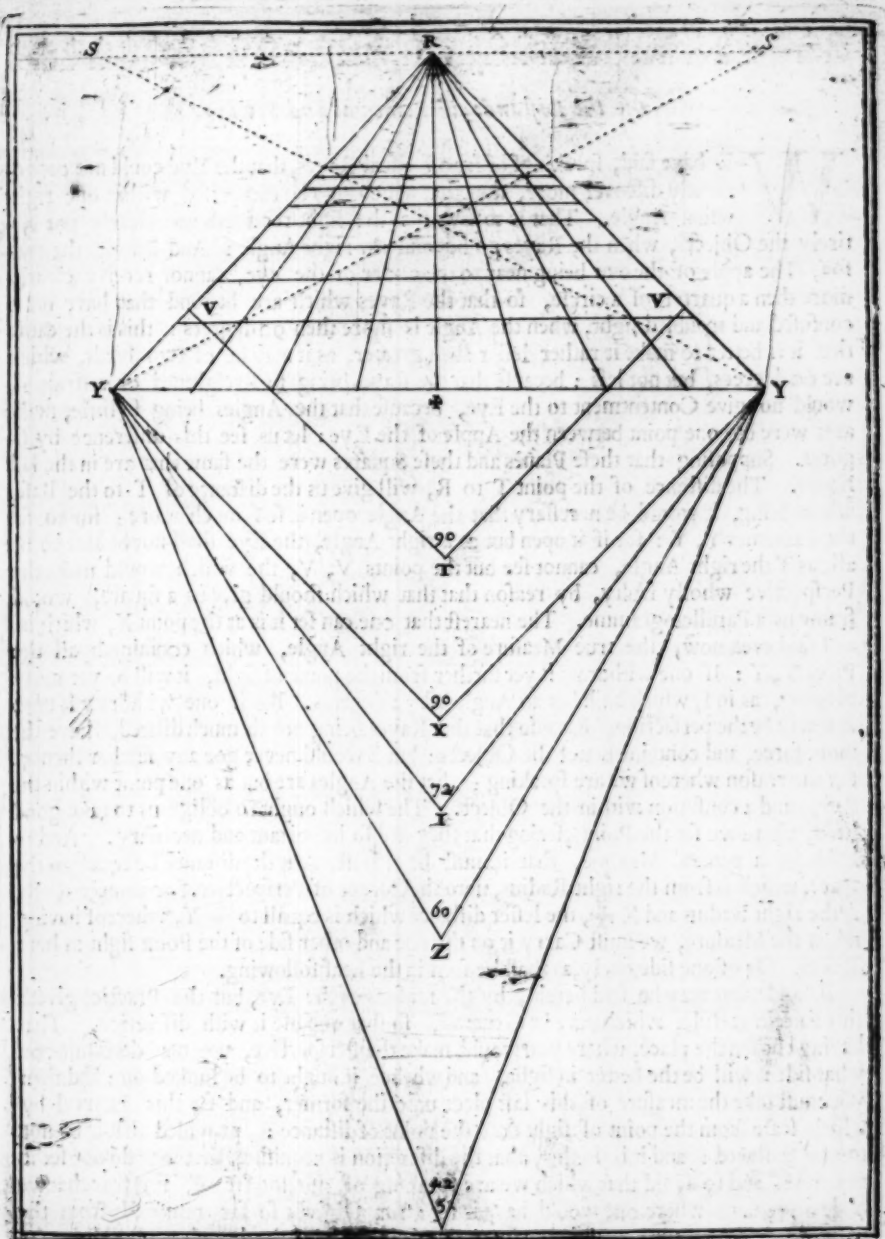
Of the visual Rayes.

THIS is a general Maxime, That all the lines which are Perpendicular to the base, within a Geometral Plane, ought always to be drawn at the point of sight, when one would set the same Planes in Perspective, for example, in the little Plane of the first figure the base is AB, upon which all the lines Z are Perpendicular to it. This being supposed, that if one give a less or a greater line then that of the Plane, as the great line A B, which hath the same number of divisions with the little one, and from all these divisions Z, one draw to the point of sight all these lines of Z to E, they will all be perpendicular to the base, according to the Reasons of Perspective, we may also name them Radial, and properly visual Rayes: the last of which are called Extremes, by reason that they are at the end of the base, as are these A B.

Of the Diagonals or Diametrals, and of their sections.

IT is also a Maxime, that all the Diagonals of squares in Perspective, are drawn at the Point of distance. For example, at the little Plane of the second Figure, the Diagonals D O, F O, are drawn at the points of distances in the Plane in Perspective, the which maketh that the points of distances do give us the Abridgements of the Objects, that the point of sight doth remove from us: in such manner (as we have already said) that if one draw from the ends of the line of the base F G to the points of distances L M, they shall be Diagonals; and where the lines shall divide the outmost Rayes F K and G K, at the points O; this shall be the Abridgment of the square, whereof F G is one side: and where the same lines shall divide the lines Z at the point Q, one must draw Parallels which shall give the Abridgement of all the squares, and a like number of all the sides, as in the little Plane. And the more these points of distances are removed from the point of sight, the more the Objects do abridge themselves and close together. And this is it, why all the Beauty of the Perspective depend-eth on the points of distances, which ought neither to be too near, nor too far off from the point of sight: the which made me set this third figure, with diversity of removals, for to cause a belief of the verity of that which I am speaking. Let us suppose then that R is the point of sight, and S S the outmost Rays; if one sets the point of distance at T, he shall divide the Radius S R, at the point V, which shall be the abridgement of the square, whereof S S is one side, the which is ridiculous to see a square which should appear three times more hollow then it ought to be, by reason that the point of the distance T is too near to the point of the sight R, for it must be at the neareſt, that the point of distance be as far removed from the point of sight, as the half of the Picture, or of the Perspective, which one would have seen, as is X, removed from R, by reason that these Removals do always give a right Angle to the Eye of the Beholder. In V it would be more pleasing, dividing the square at 2, and at 3, it would be better, dividing it at 4. At 5 it would be far enough removed, and would make the square more short in 6, as we shall give the reason in the figure following.

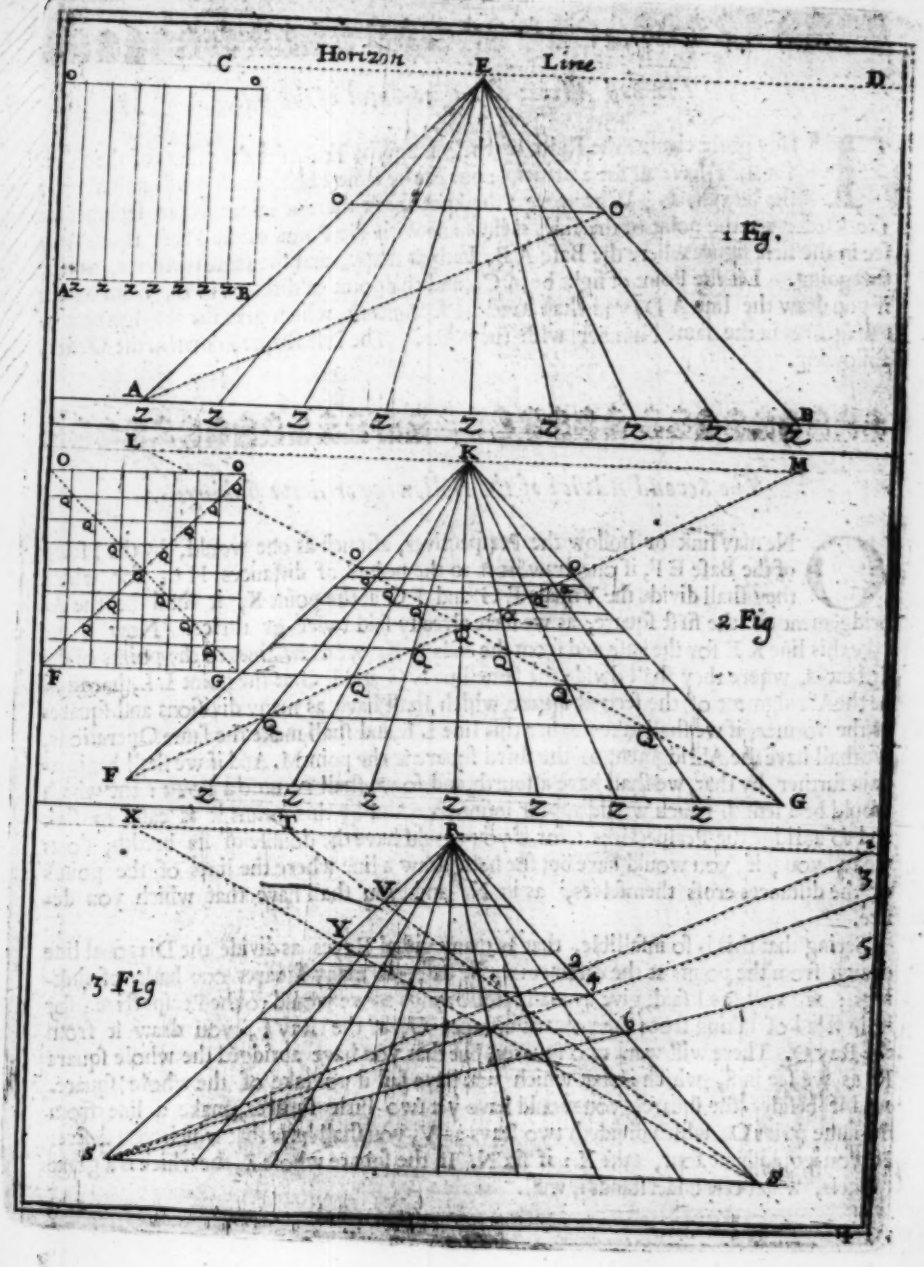
Some one may say to me, why have I then set in all the Figures of this Book, the points of distances so near, seeing that being removed farther, the whole would have been more pleasing: And he might by reason, if I had made the book only to have bin seen for curiosity: but it being made for to teach, there was need that all should be seen, the better to understand our Orders: this is the cause, that I have put into the works as much as I could. If one answer me, that it were better to make the book longer: I must then have made it much bigger, and have set but one figure in every page: the which I would avoid and make a book, convenient for carriage and it will suffice to advertise that amongst the works that one shall make, he ought to enlarge them: the which is easie, keeping the Rules which we have given.


S
R
S
V
V
Y
Y
90
T
90
X
72
I
60
Z
42
5

of the Diſtance, or Removal and Setting.

WE haye ſaid, ſpeakingf of far off viſual Rayes, that the Eye could not conveniently diſcover more, then that which may be compriſed within one right viſual Angle. That is to ſay, that the ſight receiveth not clearly nor entirely the Objects, when the Rayes go beyond the right Angle: And behold the reaſon, The apple of the eye being near to the center of the eye, cannot receive clearly more then a quarter of a circle, ſo that the Rayes which are beyond that have but a confuſed and troubled ſight, when the Angle is more then 90 degrees: this is the cauſe that it is better to make it rather leſſer then greater, as it may be of two thirds, which are 60 degrees, but not leſs: becauſe that the Rayes being ſo ſtreightned or reſtrained, would not give Contentment to the Eye, becauſe that the Angles being ſo little, make as it were but one point between the Apple of the Eye: let us ſee this difference by figures. Suppoſing that theſe Planes and theſe Squares were the ſame that are in the laſt figure. The diſtance of the point T to R, will give us the diſtance of T to the Baſe, where being, it would be neceſſary that the Angle open it ſelf much more; for to ſee the Extremes Y, Y: for if it open but as a right Angle, the Eye ſhall not be able to ſee all, as T the right Angle, cannot ſee but the points V, V, the which would make the Perſpective wholly faulty, by reaſon that that which ſhould give us a ſquare, would frame us a Parallelogramme. The neareſt that one can ſet it is at the point X, which is, as I ſaid even now, the true Meaſure of the right Angle, which containeth all the Piece Y, Y: If one withdraw it yet further from the point of ſight, it will be yet more pleaſing, as in I, which hath but an Angle of 72 degrees. But if one withdraw it unto Z it will be the perfection, becauſe that the Rayes being not ſo much dilated, have the more force, and conteine better the Objects: but I would never goe any farther then 5. for the reaſon whereof we are ſpeaking; that the Angles are but as one point within the Eye, and a confuſion within the Object. The which ought to oblige us to take good heed, where we ſet the Points, ſeeing that they are ſo important and neceſſary. And to hold for a general Maxime, that it muſt be at leaſt, that the diſtance be equall to the ſpace, which is from the right Radius, unto the Corner of Perſpective. For xample ✣ R, is the right Radius and X ✣, the leſſer diſtance which is equall to ✣ Y, whereof having taken the Meaſure, we muſt Carry it on the one and other ſide of the Point ſight as here R S S. Or of one ſide onely, as ſhall be ſeen in the Leaf following.

Behold what may be ſaid herein, by the reaſons of the Eye, but the Practice giveth this Excellent Rule, which may be Generall, ſo that one uſe it with diſcretion. That having choſen the place, where you would make the Perſpective, you may determine on what ſide it will be the better in ſight, and whence it ought to be looked on: and then you muſt take the meaſure of this laſt place unto the former, and ſet this Interval by a little ſcale from the point of ſight unto the point of diſtance: provided that it be not too far removed: and it is in this, that the diſcretion is requiſite, that one do not ſet it too near, and to avoid that which we are ſpeaking of, nor too far off, for fear that we finde no returns where one would have it ſet: for Objects ſo far removed from the ſight do yield no return. This is why we ought to give but the draught to Buildings far diſtant, as we ſhall ſay hereafter.


Horizon Line
C
E
D
O
O
A
B
1 Fig.
L
K
M
F
G
2 Fig
X
T
R
V
Y
3 Fig
S
S

The first Advice about the Point of the side.

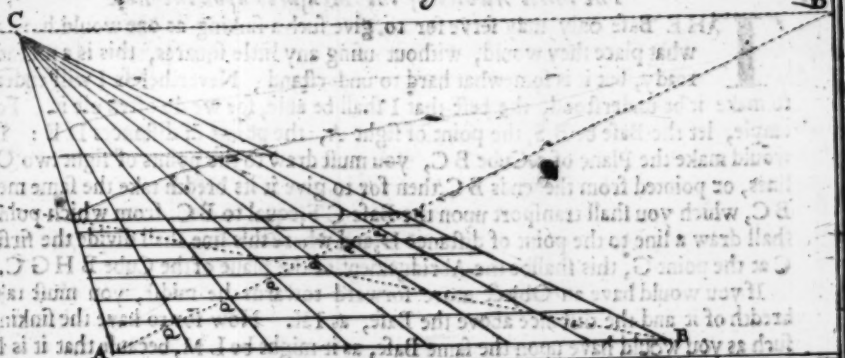
THey never change the Rules of the Point of the Front for the points of the sides; for they have all for a principle one & the same cause, which produceth always the like effects; Wherefore I shall not speak thereof in particular seeing that the Order of the point of the side, is the same with the Point of the Front as one may see in the first figure where the Base A B, hath as many, and the same divisions, as the foregoing. Let the Point of sight be in C, and the point of distance in D, from which if you draw the line A D, you shall have the sections Q, which give the abridgement of the squares in the same Number with the other. The rest shalbe known in the Orders following.

The Second Advice of the Hollowing or deepe sinkings.

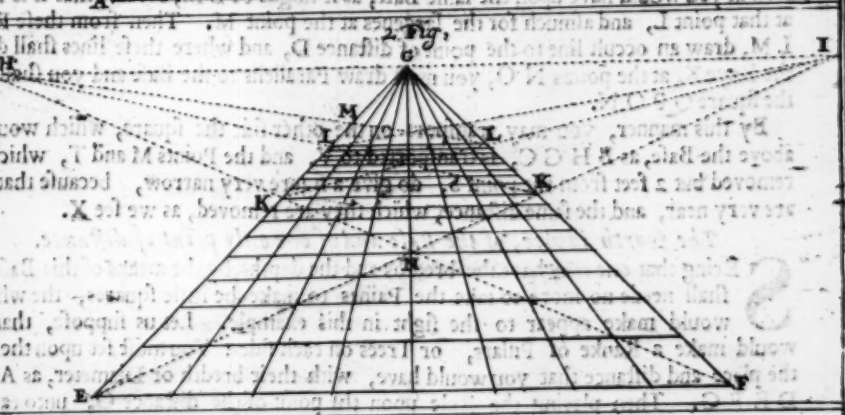
ONe may sink or hollow the Perspectives, asmuch as one would, by the Means of the Base E F, if one draw lines to the points of distances H I; for which they shall divide the Visuals E G and F G at the point K, it shall be the Abridgement of the first square, as we have already said twice or thrice. Now if we take this line K K for the base, and from the ends K K, we draw lines to the points of the distances, where they shall divide the same line E G and F G at the point L L, that shall be the Abridgment of the second square, which shall have as many divisions and squares as the former; if we shall take further this line L L, and shall make the same Operations, we shall have the Abridgment of the third square at the point M. And if we shall begin again further by that, we shall have a fourth, and so we shall go unto a Point: the which would be a length which would appear infinite; And by this means it is easie to sink and to abridge the Perspectives: for if you would have the double of its bredth, do as we tell you; if you would have but the half, draw a line where the lines of the points of the distances cross themselves, as in N, and you shall have that which you desire.

Seeing that this is so infallible, that as many visual Rayes as divide the Diagonal line drawn from the points at the distances to the base, so many squares one hath of sinkings: we may, as I said, give as many hollowings as we would to the Perspective; for if in stead of taking from the point of distance O, at the Ray F, you draw it from the Ray Q. There will want two squares, but that you have abridged the whole square R, as we see in S, which is that which you have fail d to take of the whole square. And if besides the square, you would have yet two little squares, make a line from the same point O, which divideth two Rays as V, you shall have that which you desire. If you would have four, take X: if six N. If the square whole Z, the which is a great easines, when one understands it well.

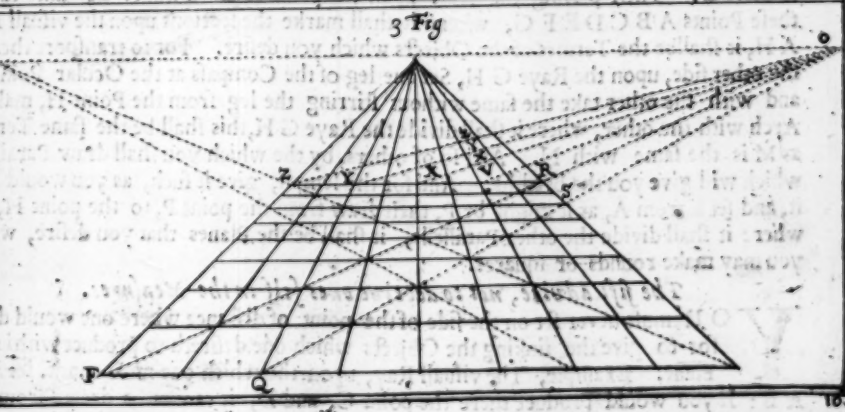
1 Fig



2 Fig.



3 Fig



E.

The third Advice of the Meaſures upon the Eaſe

THE Baſe only may ſerve for to give ſuch a ſinking as one would have and in what place they would, without uſing any little ſquares, this is a means very ready, but it is ſomewhat hard to underſtand; Nevertheleſs I will endeavour to make it be underſtood, the beſt that I ſhall be able, for we do often uſe it. For example, let the Baſe be B S, the point of ſight A, the points of diſtances D E: If you would make the Plane of a Cube B C, you muſt draw to the points of ſight two Occult lines, or pointed from the ends B C, then for to give it its bredth take the ſame meaſure B C, which you ſhall tranſport upon the Baſe C F, equal to B C, from which point you ſhall draw a line to the point of diſtance D, and where this line ſhall divide the firſt Ray C at the point G, this ſhallbe the Abridgement of the plane of the Cube B H G C.

If you would have an Object more forward towards the midſt, you muſt take the bredth of it and the diſtance above the Baſe, as I K. Now for to have the ſinking, ſet ſuch as you would have upon the ſame Baſe, as it might be L M, becauſe that it is broad at that point L, and aſmuch for the largenes at the point M. Then from theſe Points L M, draw an occult line to the point of diſtance D, and where theſe lines ſhall divide the Raye K, at the points N O, you muſt draw Parallells to the Baſe and you ſhall have the ſquare Q P O N.

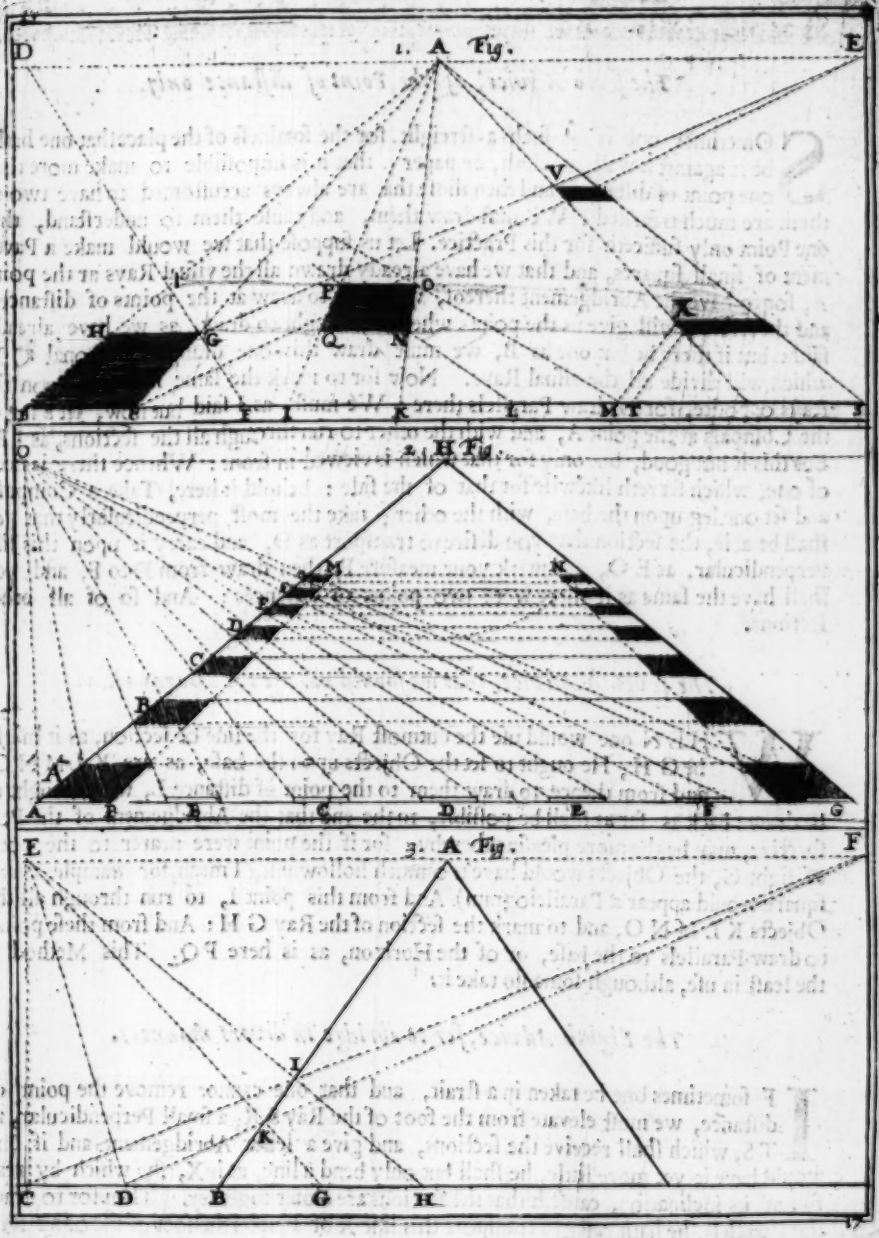
By this manner, you may tranſport on the other ſide the ſquare, which would be above the Baſe, as B H G C, is tranſported to V, and the Points M and T, which are removed but 2 feet from the point S, do give a figure very narrow, becauſe that they are very near, and the ſame diſtance, which they are removed, as we ſee X.

The fourth advice, of the Baſe and of one only point of diſtance.

SEeing that one may have the bredths and the depths, by the means of this Baſe, one ſhall neede no more to take the Paines to make the little ſquares, the which I would make appear to the ſight in this example. Let us ſuppoſe, that you would make a Ranke of Pillars, or Trees on each ſide: You muſt ſet upon the Baſe the place and diſtance that you would have, with their bredth or Diameter, as A B C D E F G. Then placing the Rule upon the point of the diſtance O, unto each of theſe Points A B C D E F G, where it ſhall marke the ſections upon the viſuall Raye A H, it ſhallbe the Termes of the Objects which you deſire. For to tranſport them on the other ſide, upon the Raye G H, Set one leg of the Compaſs at the Ocular Point H, and with the other take the ſame without ſtirring the leg from the Point H, make an Arch with the other, where it ſhall divide the Raye G H, this ſhall be the ſame Terme; as M is the ſame with N. And ſo of others, by the which you ſhall draw Parallells, which will give you the bredths. And for the length, give it ſuch, as you would have it, and ſet it from A, as it might be P, then draw from the point P, to the point H, and where it ſhall divide the other Parallells, it ſhall be the Planes that you deſire, which you may make rounds or ſquares.

The fift advice, not to deceive ones ſelf in the Meaſures.

YOU muſt never ſet on the ſide of the point of diſtance where one would draw for to give the ſinking the Objects which one deſireth to produce within the Plane. Example, The viſuall Ray, upon the which one muſt mark, let it be A B: If you would produce there the point C, and D, it cannot be drawn from the point of diſtance E, but well from that which is oppoſite to it F. If C and D, were within, as G H, it ought to be drawn from the point E: becauſe that the line of the ſection meeteth between both, and not from the point E: and ſo both the one, and the other ſhall divide themſelves in the ſame point I K.


1. A Fig.
D
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2. H Fig.
O
M
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E
C
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E
F
G
3. A Fig.
E
F
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K
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H

The sixth Advice, of the Point of distance only.

SOmetimes one is at such a streight for the smalness of the place that one hath, be it against a wall, or cloth, or paper; that it is impossible to make more then one point of distance, and then those that are always accustomed to have two of them are much troubled: We must draw them, and cause them to understand, that one Point only sufficeth for this Practice. Let us suppose that we would make a Pavement of small squares, and that we have already drawn all the visual Rays ar the point A, for to have the Abridgement thereof, we ought to draw at the points of distances, and the sections will give us the points where we ought to draw, as we have already said: but if there be but one as B, we must draw this one draught Diagonal C B, which will divide all the visual Rays. Now for to mark the same sections upon the Rays opposite, for to draw Parallels there: We must, as I said but now, set a leg of the Compass at the point A, and with the other to run through all the sections, as I P: But this is not good, but only for that which is viewed in front: Whence there is need of one, which serveth likewise for that of the side: behold it here, Take a Compass, and set one leg upon the base, with the other; take the most perpendicularly that you shall be able, the section that you desire to transport as D, and carry it upon this line Perpendicular, as E O, and mark your measure F, then draw from D to F, and you shall have the same as if there were two points of distances: And so of all other sections.

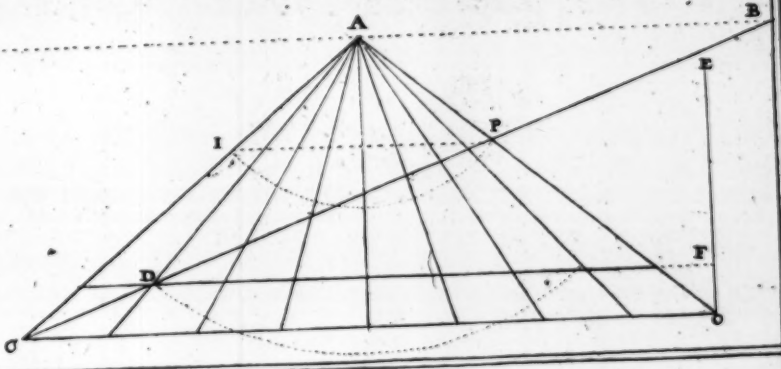
The seventh Advice, that we should not use the Diagonal.

WHEN one would use the outmost Ray for the line or section, as it might be G H; He ought to set the Objects upon the base, as are K L M N O, and from thence to draw them to the point of distance L, which ought to be drawn back as far as shall be possible, to the end that the Abridgement of the Perspective, may be the more pleasing thereby: for if the point were nearer to the point of sight G, the Objects would have too much hollowness, (I mean, for example, that a square would appear a Parallelogram) And from this point I, to run through all the Objects K L M N O, and to mark the section of the Ray G H: And from these points to draw Parallels to the base, or of the Horizon, as is here P Q. This Method is the least in use, although some do take it.

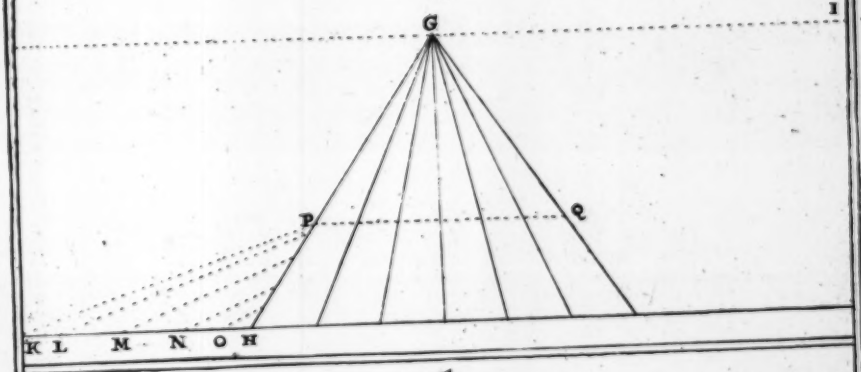
The Eighth Advice, for to abridge in divers manners.

IF sometimes one be taken in a strait, and that one cannot remove the point of distance, we must elevate from the foot of the Ray S R, a small Perpendicular, as T S, which shall receive the sections, and give a lesser Abridgement; and if one would have it yet more little, he shall but only bend a line, as is X, the which by reason of its inclination, causeth that the sections are closer together. Then for to draw the Parallels, he hath only to transport this line X or T, upon the foot of the other Ray as is V, and from all these points to draw lines Parallels to the base, and you shall have that which you desire.

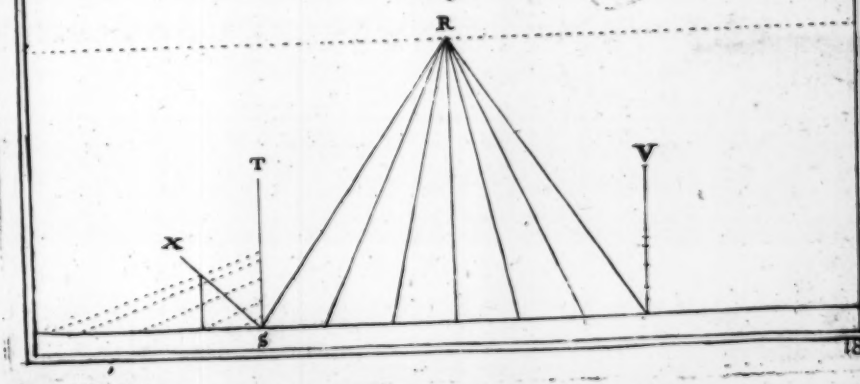
1 Fig



2 Fig



3 Fig



THE ORDERS FOR PLANES IN Perſpective.

Of Planes viewed directly or in front.

ONE may have seen at the third and fourth Advice, and the Elevations following will cause to know, that it is not my purpose that one should use Planes Geometrical, for to make Perspectives: for this would be to double the labour; and no Painter would take this pains, seeing that I teach him to make the same thing by means of the base. But as there is no Rule so general, which hath not its exception; so there are certain Figures, which one cannot set into Perspective, but by the help of these Planes: further also, one should be troubled, if one should give one of these Planes to be set into Perspective, and that one had not learned how he ought to proceed. These Reasons have obliged me to set these which follow, the which will suffice to learn to set into Perspective all those, which may be presented and also be imagined.

1. To contract or abridge a square A B C D. One must draw A B at the point of sight E, and from the same Angles A B, two Diagonals, F B, A G, and where they shall divide the Rays A E and B E, at the points H and I. This shall be the square A B C D, abridged into A H I B; for to make it without the Geometrical Plane, we must draw from B to F, or from A to G, or else transport A B upon the base, as B K, and from the point K to draw to the point F, it will give the same section I upon the Ray B E.

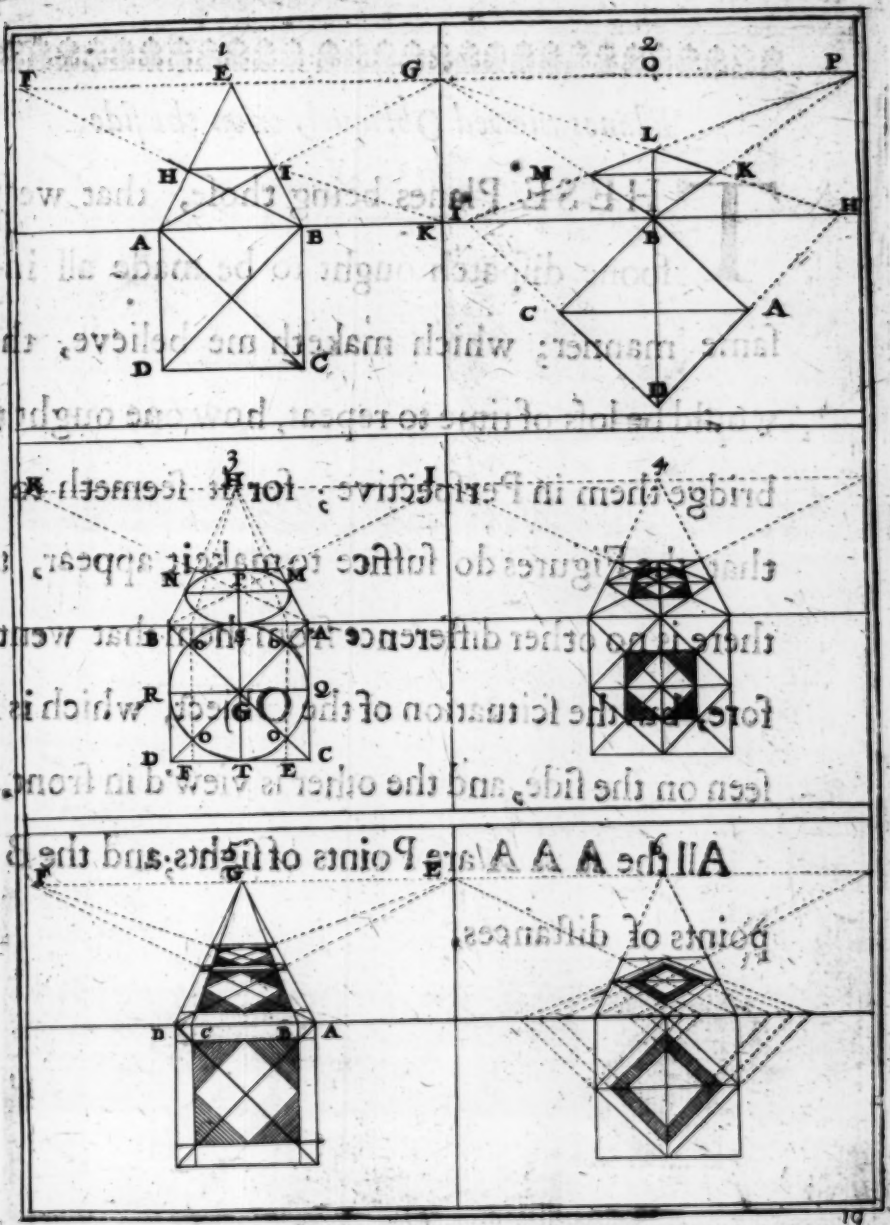
2. To abridge a square viewed by the Angle D, having made the Plane A B C D. We must draw a line which toucheth the Angle B, and it must be in right Angle upon the line B D. This base being produced, we must set the Rule upon the sides of the square, as A D, and D C, and where this Rule shall divide the base, there to make the points H I, then to draw H and B, to the points of distances P and B I, to the other point of distance G. And at the section of these lines to make the points which shall give you the square K L M B; for to make it without the Plane, you must set the Diameter on the one part, and the other of the middle B, as H and I. But as well in the one manner as the other, you must not draw at the point of sight O.

3. To abridge a Circle. It must be enclosed in a square A B C D: And from the Angles A D and G B, to draw Diagonals, which shall divide the Circle into eight parts; and where they shall divide it at the point O, to draw upon the base the Perpendiculars E F, then to draw two lines Diametral Q R S P, which divide themselves in right Angles at the Center G. The Plane being ordered in this manner, you must draw all the Perpendiculars at the point of sight H, and where they are divided, the Diagonals A K, and B I, to make points; of the which the two latter M N, are the draughts of the square, which are to be divided into four by the section of the Diagonals, at the point P. Then from the ends of this Cross they draw bended lines by these points, which give the shape of a Circle in Perspective. This manner may pass for little ones: but we shall give one more exact for the greater.

4. This Figure is composed of the two first, wherefore I will say nothing of it; for he that shall have made one or two of them, shall be able to make it easily.

5. The fifth depends also upon the two first: but there is also more a Border round about, which they have not; for to set this Border into Perspective, we must draw these four Rays A B C D, at the point of sight G, and where the inward Rays B and C are divided by the Diagonals A F and D E, we must draw Parallels to the base, and you shall have that which you demand.

6. It is the same with the second, except that it is compassed about with two Borders: wherefore I will speak no more of it.


1
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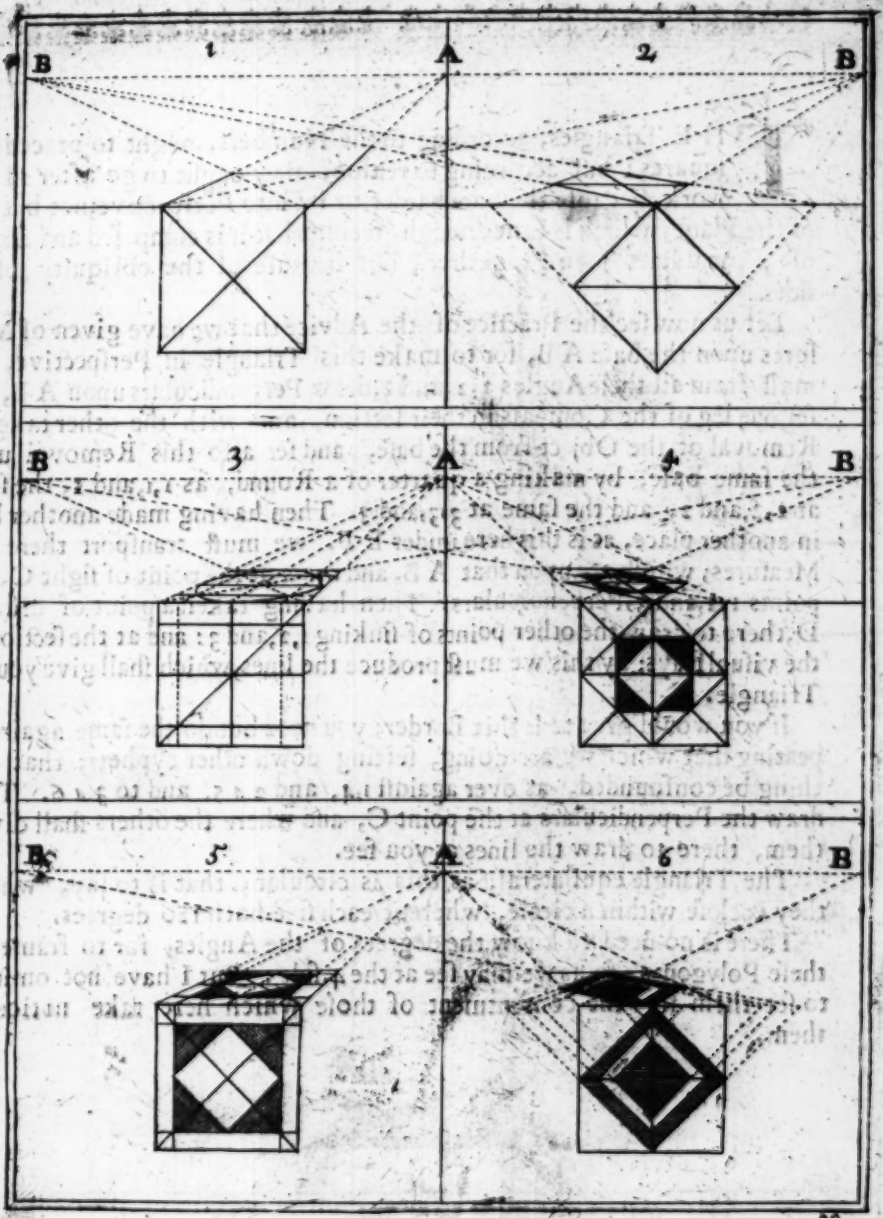
6

Planes viewed Obliquely or on the ſide.

THESE Planes being thoſe, that we will ſoone diſpatch ought to be made all in the ſame manner; which maketh me believe, that it would be loſs of time to repeat, how one ought to abridge them in Perſpective; for it ſeemeth to me, that the Figures do ſuffice to make it appear, that there is no other difference from them that went before, but the ſcituation of the Object, which is here ſeen on the ſide, and the other is view'd in front,

All the A A A are Points of ſights; and the B B B points of diſtances,



Fig

Of a Triangle.

THE Triangles, according to the Numbers, ought to precede the ſquares: but according to reaſon, they ought to go after in this work, becauſe they are harder to ſet into Perſpective, not becauſe of the Plane, which is eaſie enough, ſeeing that it is compoſed and framed of 3 equal lines joyn'd together; but becauſe of the obliquity of its ſides.

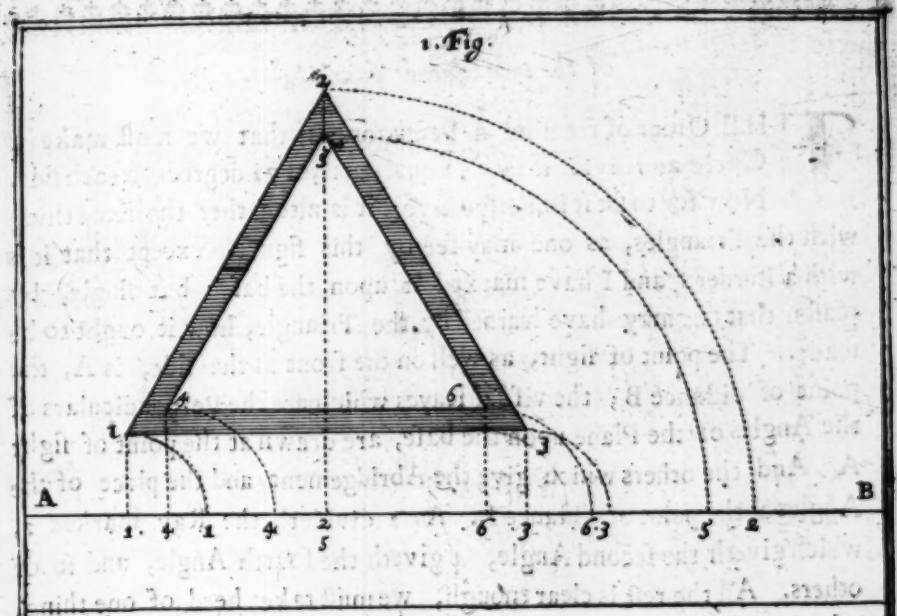
Let us now ſee the Practice of the Advice that we have given of Meaſures upon the baſe A B, for to make this Triangle in Perſpective, we muſt from all theſe Angles 1,2, and 3, draw Perpendiculars upon A B, and ſet one leg of the Compaſs in their ſection, and with the other take the Removal of the Object from the baſe, and ſet alſo this Removal upon the ſame baſe, by making a quarter of a Round, as 1,1, and 1, the ſame at 2,2, and 2, and the ſame at 3,3, and 3. Then having made another baſe in another place, as is this here under E F, we muſt tranſport there the Meaſures, which are upon that A B, and draw at the point of ſight C, the points 1,2, and 3, Perpendiculars. Then having taken a point of diſtance D, there to draw the other points of ſinking 1,2, and 3: and at the ſection of the viſual Rays: by this we muſt produce the lines, which ſhall give you the Triangle.

If you would give to it this Border, you need but do the ſame again, repeating that which we are doing, ſetting down other cyphers, that nothing be confounded, as over againſt 1,4, and 2 *a* 5. and to 3 *a* 6. Then draw the Perpendiculars at the point C, and where the others ſhall divide them, there to draw the lines as you ſee.

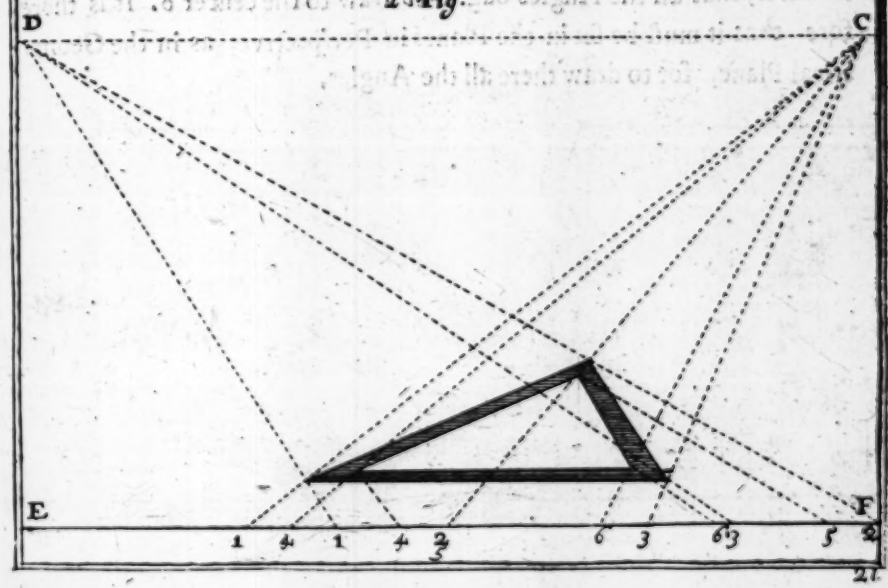
The Triangle equilateral, as this is circular; that is to ſay, which they encloſe within a circle, whereof each ſide hath 120 degrees.

There is no need to know the degrees of the Angles, for to frame all theſe Polygones, ſo as we may ſee at the 4. ſide: but I have not omitted to ſet them for the contentment of thoſe which here take notice of them.

1. Fig.

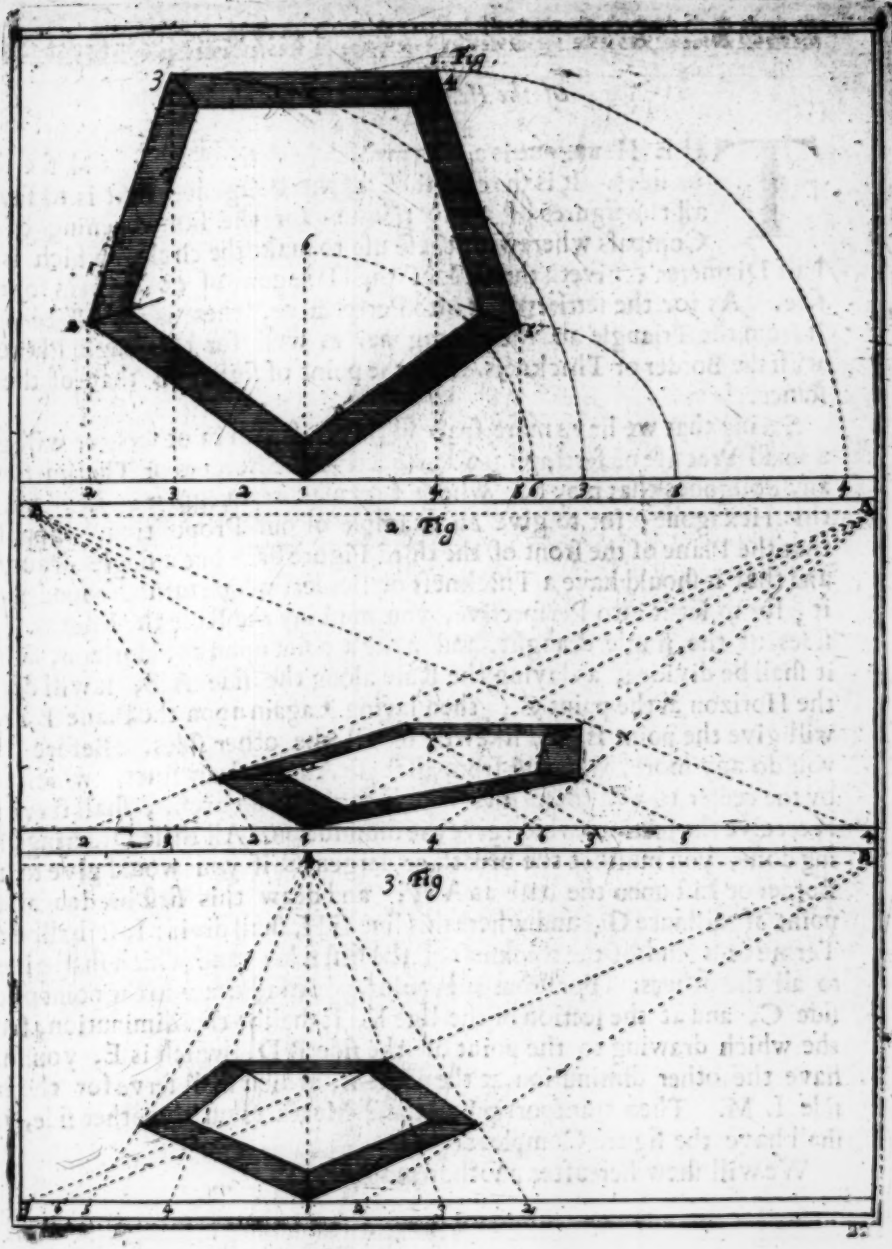


2. Fig.



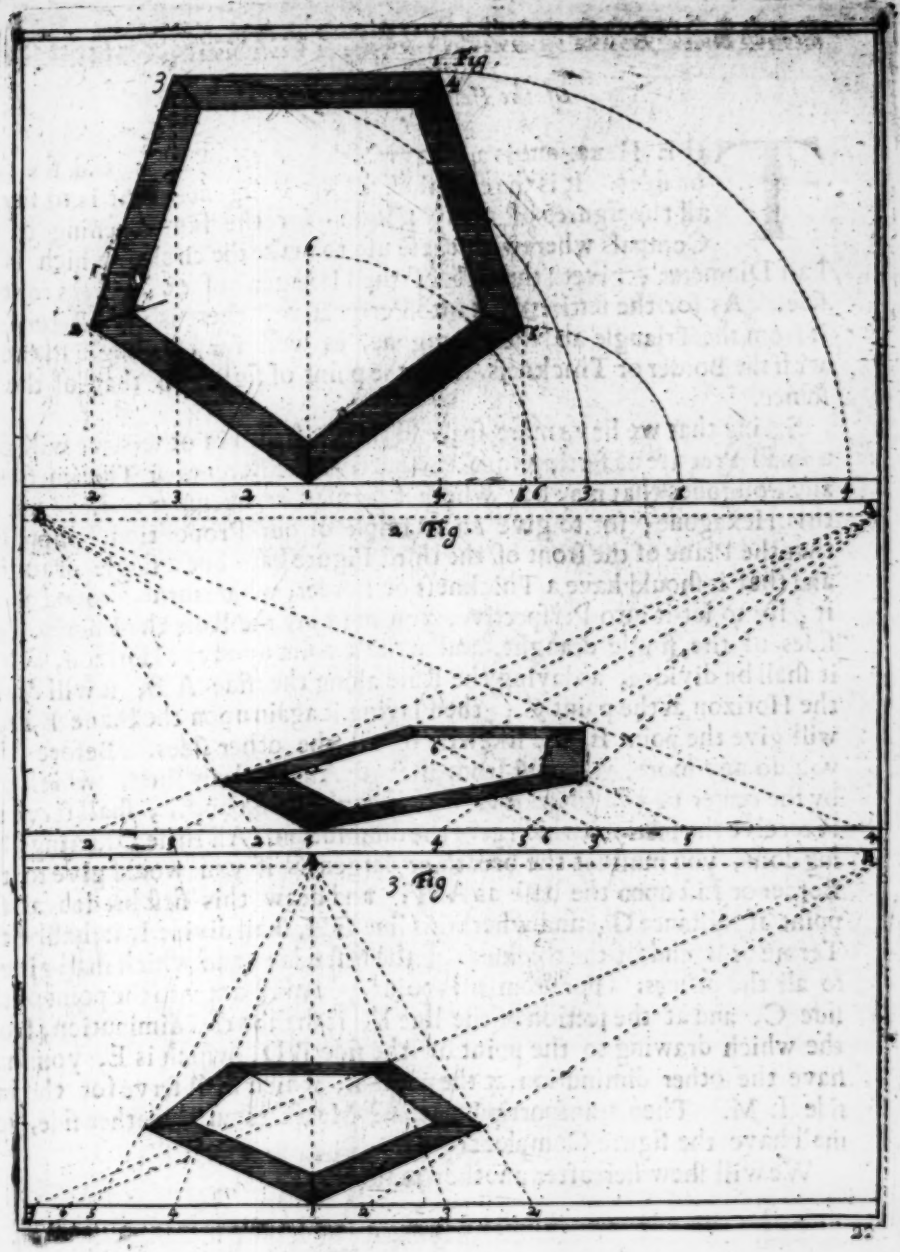
Of the Pentagone or five-Angles.

THE Order of framing a Pentagone is, that we muſt make a Circle, and divide it into 5 equal Parts, of 72 degrees on each ſide. Now for to ſet it in Perſpective, it is altogether the ſame thing with the Triangles, as one may ſee by this figure, except that it is with a Border; and I have marked it upon the baſe: but ſingle, by reaſon that one may have learned by the Triangle, how it ought to be made. The point of ſight, as well on the front as the ſide, is A, the point of diſtance B; the viſual Rayes which are the Perpendiculars of the Angles of the Plane upon the baſe, are drawn at the point of ſight A. And the others which give the Abridgement, and the place of the Angles at the point of diſtance B. As 2 divideth the Ray marked 2, which giveth the ſecond Angle, 4 giveth the fourth Angle, and ſo of others. All the reſt is clear enough, we muſt take heed of one thing, which is, that all the Angles ought to draw to the center 6. It is therefore, that it muſt be ſet in the Planes in Perſpective, as in the Geometrical Plane, for to draw there all the Angles.


1 Fig.
2 Fig
3 Fig

Of the Pentagone or five-Angles.

THE Order of framing a Pentagone is, that we muſt make a Circle, and divide it into 5 equal Parts, of 72 degrees on each ſide. Now for to ſet it in Perſpective, it is altogether the ſame thing with the Triangles, as one may ſee by this figure, except that it is with a Border; and I have marked it upon the baſe: but ſingle, by reaſon that one may have learned by the Triangle, how it ought to be made. The point of ſight, as well on the front as the ſide, is A, the point of diſtance B; the viſual Rayes which are the Perpendiculars of the Angles of the Plane upon the baſe, are drawn at the point of ſight A. And the others which give the Abridgement, and the place of the Angles at the point of diſtance B. As 2 divideth the Ray marked 2, which giveth the ſecond Angle, 4 giveth the fourth Angle, and ſo of others. All the reſt is clear enough, we muſt take heed of one thing, which is, that all the Angles ought to draw to the center 6. It is therefore, that it muſt be ſet in the Planes in Perſpective, as in the Geometrical Plane, for to draw there all the Angles.

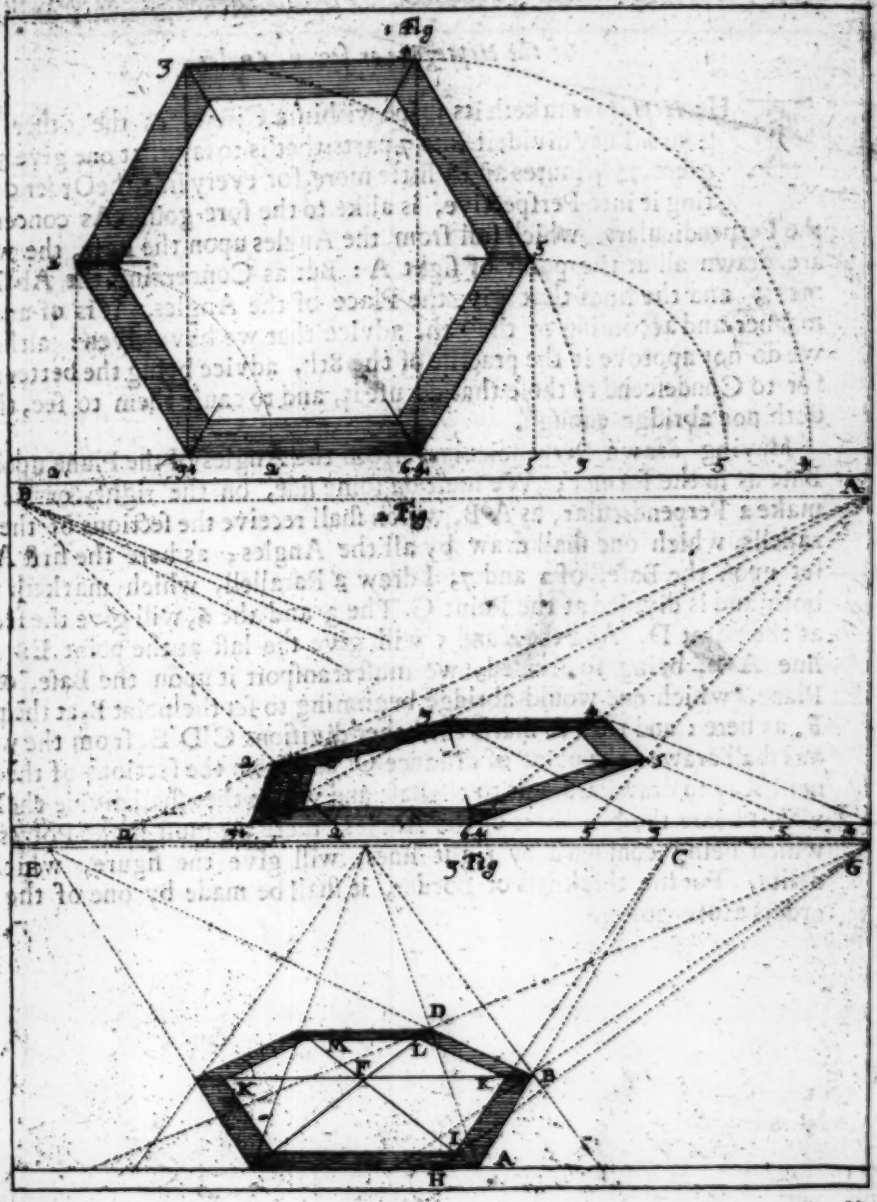

1 Fig.
3
4
6
2 3 2 1 4 5 6 3 2 1
2 Fig.
3 Fig.

Of the Hexagone, or six Angles.

THE Hexagone is a Plane which hath six Angles, and six faces or sides. It is the easiest of all the Poligones, that is to say, of all the figures of many sides: for the same opening of the Compass wherewith these use to make the circle, which is its half Diameter; giveth the sides of the Hexagone of 60 degrees for each side. As for the setting of it into Perspective, there is no difference in it from the Triangle and the Pentagone, as well for the single Plane as with the Border or Thickness. A is the point of sight, B that of the distance.

Seeing that we have more space in this leaf then in others; we will give a small Practise of setting into Perspective the Borders or Thicknesses of any Poligones that may be, whether regular or irregular: Let us use this Hexagone; for to give an example of our Proposition, supposing that the Plane of the front of the third Figure hath but a single draught; and that it should have a Thickness or Border, which turneth round about it; for to set it into Perspective, you must lay the Rule the length of the sides of the single draught, and make a point upon the Horizon, where it shall be divided, as laying the Rule along the side A B, it will divide the Horizon at the point C; then laying it again upon the Plane B D, it will give the point E, and likewise of all the other sides. Before that you do any more, you must from all these Angles draw lines, which pass by the center F, and these lines which ought to be occult, shall serve for to receive the sections which give the diminution. All these Orderings being done, you must set the bredth or largeness if you would give to the Border or List upon the base as A H; and draw this first bredth at the point of distance G; and where this line G H, shall divide I, it shallbe the Terme or bound of the thickness of the fitst side: and which shall give it to all the others. For from this point, you must draw to the point of the side C, and at the section of the line K, it shallbe the diminution, from the which drawing to the point of the side B D, which is E, you shall have the other diminution at the point L, which shall serve for the last side L M. Then transporting all these Measures on the other side, you shall have the figure Compleat.

We will shew hereafter another manner.

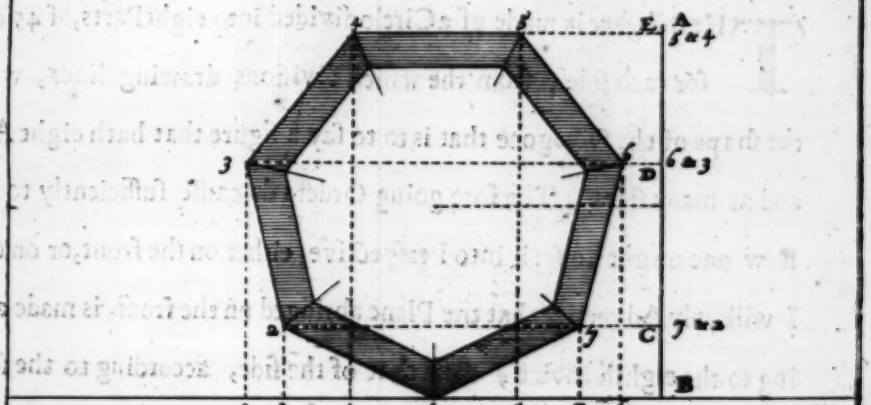

1 Fig
2 Fig
3 Fig
A
B
C
D
E
F
G
H
I
K
L
M

Of the Heptagone or ſeven-Angles.

THe *Heptagone* taketh its ſhape within a Circle, as the other Poligones. They divideit into 7 parts: that is to ſay, that one give 51 degrees, 25 Minutes and a little more, for every ſide, the Order of ſetting it into Perſpective, is alike to the fore-going; As concerning the Perpendiculars, which fall from the Angles upon the Baſe, the which are drawn all at the point of ſight A: But as Concerning the Abridgement, and the lines that give the Place of the Angles, it is of another manner and according to the 7th. advice that we have given: although we do not approve it the practiſe of the 8th. advice being the better: but for to Condeſcend to thoſe that do uſe it, and to cauſe them to ſee, that it doth not abridge enough.

Having drawn Perpendiculars from the Angles of the Plane upon the Baſe as in the former; We muſt on ſome ſide, on the right, or the left, make a Perpendicular, as A B, which ſhall receive the ſections of the Parallells, which one ſhall draw by all the Angles; as here the firſt Angle ſet upon the Baſe, of 2 and 7, I draw a Parallell, which marketh them both, and is divided at the Point C. The 3 and the 6, will give the ſection at the point D. And the 4 and 5 will give the laſt at the point E: This line A B, being ſo divided, we muſt tranſport it upon the Baſe, of the Plane, which one would abridge beginning to ſet the point B, at the point F. as here: and then to mark the other diviſions C D E, from the which one ſhall draw to the point of diſtance O, and from the ſections of the outmoſt Ray to draw Parallells to the Baſe: and where they ſhall divide the Rays which beare the Numbers of the Angles, there we muſt make Points, the which being conjoyn'd by right lines, will give the figure, which we deſire. For the thickneſs or Border, it ſhall be made by one of the two orders afore-going.

1. Fig.


4
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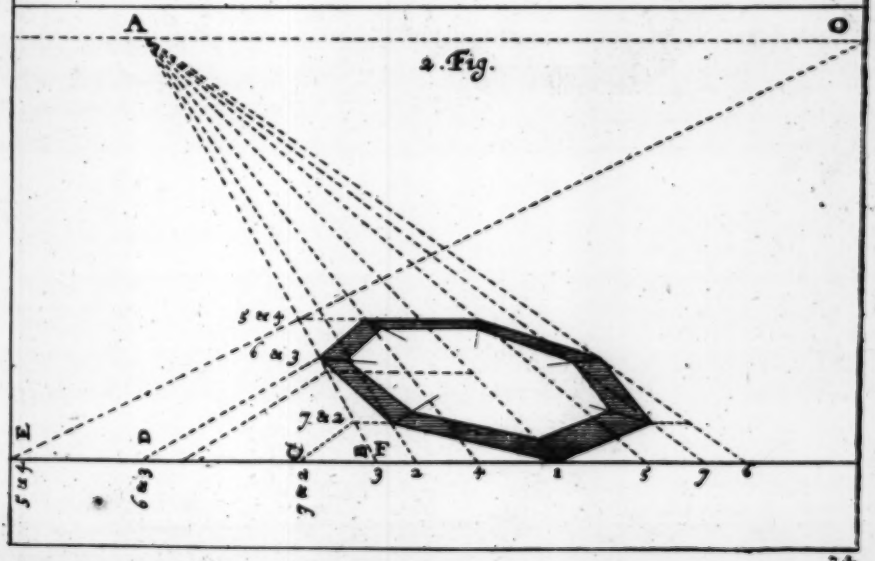
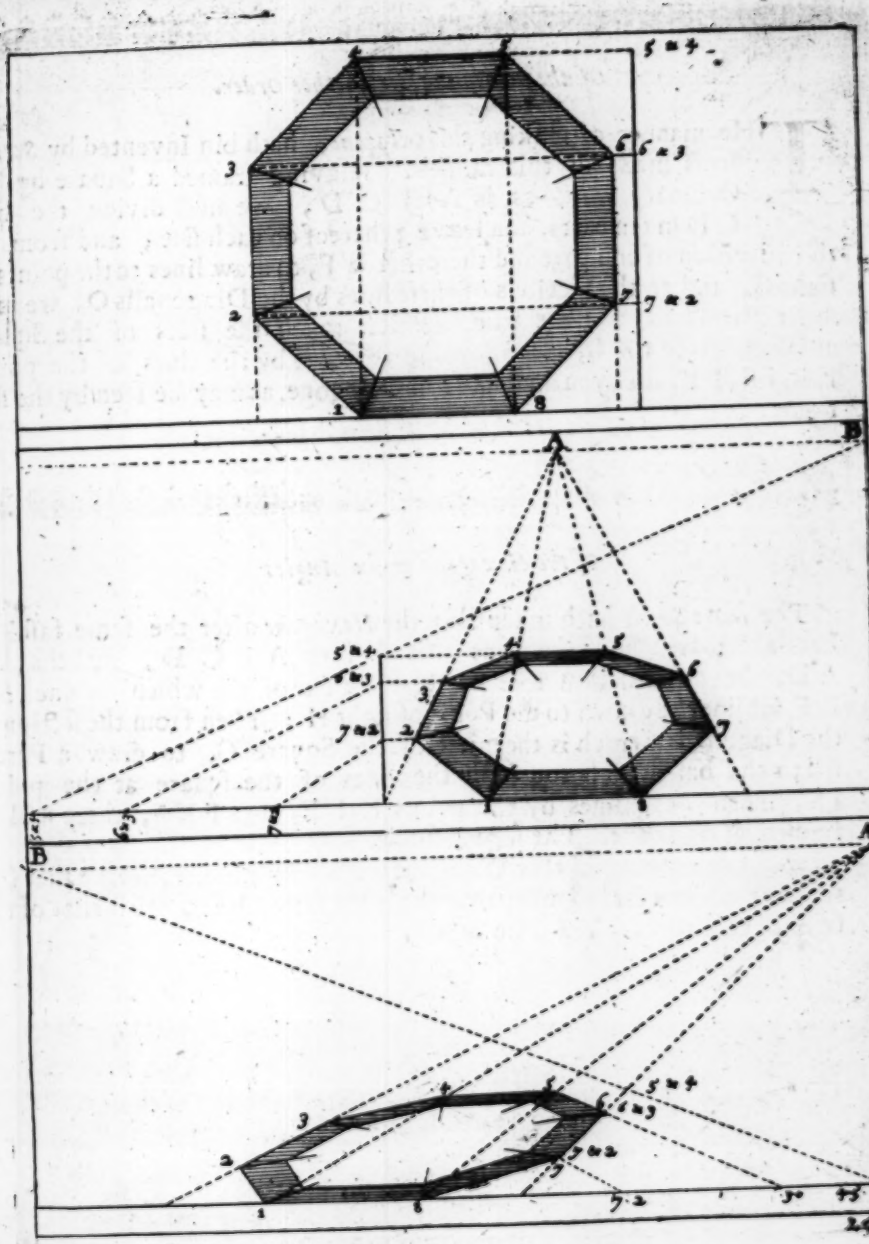
D
6 & 3
2
C
7 & 2
B
3 2 4 1 5 7 6


A
O
2. Fig.
5 & 4
6 & 3
7 & 2
E
D
C
F
5 & 4
6 & 3
7 & 2
3 2 4 1 5 7 6
24

Of the Octogone, or Eight-Angles.

THe *Octogone* is made of a Circle divided into eight Parts, of 45 degrees for each side; from the which divisions drawing lines, we have the shape of the Octogone that is to to say a figure that hath eight Angles, and as many sides. The fore going Orders do cause sufficiently to know, how one ought to set it into Perspective, either on the front, or on the side. I will only Advertize that the Plane abridged on the front, is made according to the eighth advice; And that of the side, according to the seventh. The point of the sight is A, and that of the distance B. The rest is sufficiently seen without an Exposition.



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Of the Octogone after another Order.

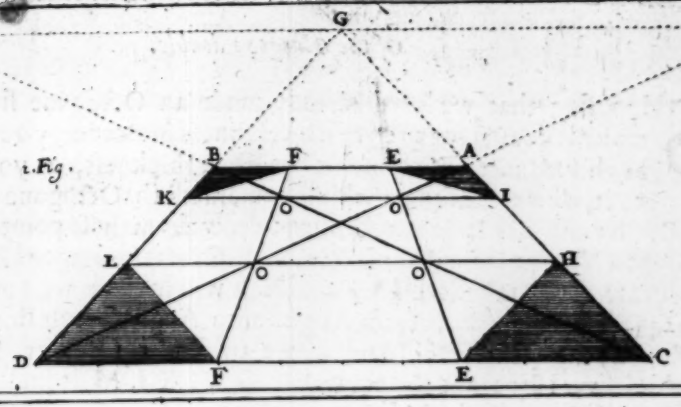
THe manner of making this *Octogone*, hath bin Invented by *Serlio*: It is made in this fashion. Having framed a Square by the Ordinary way, as is A B C D, we must divide the base C D in ten parts, and leave 3 thereof on each side; and from the third division of one part and the other E F, to draw lines to the points of sight G, and at the sections of these lines by the Diagonalls O, we must draw Parallells to the base, which touch the sides of the Square at the points H I K L, then joyning together by the lines of the points E H, I E, F K, L F, you shall have an Octogone, as may be seen by the first figure.

Of the Hexagone or six-Angles

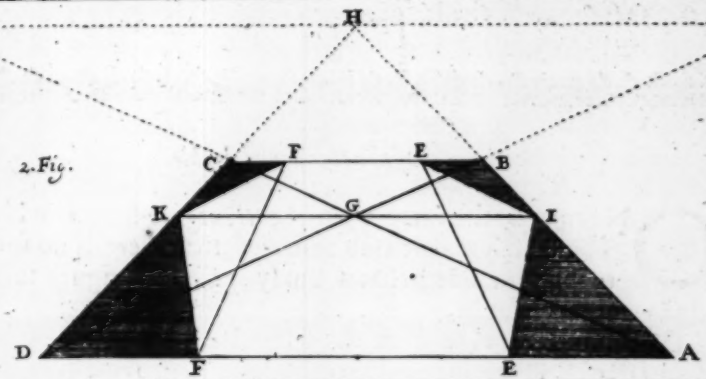
The same *Serlio* hath made also the *Hexagone* after the same fashion. Let a Square be drawn as this before A B C D, and that the A D, be divided into four Parts, from one of the which on each side E F, let lines be drawn to the Point of sight H: Then from the section of the Diagonalls, which is the midst of the Square G, to draw a Parallell to the base which toucheth the sides of the square at the points I K. Then draw lines by the points E I E, and F K F, there will be framed an *Hexagone*. The second figure.

I will say nothing of this Octogone view'd on the side, seeing that (as we have already said so many times) it is the same Order, with that of the sight of the front. The third figure.

1. Fig.



2. Fig.



3. Fig.

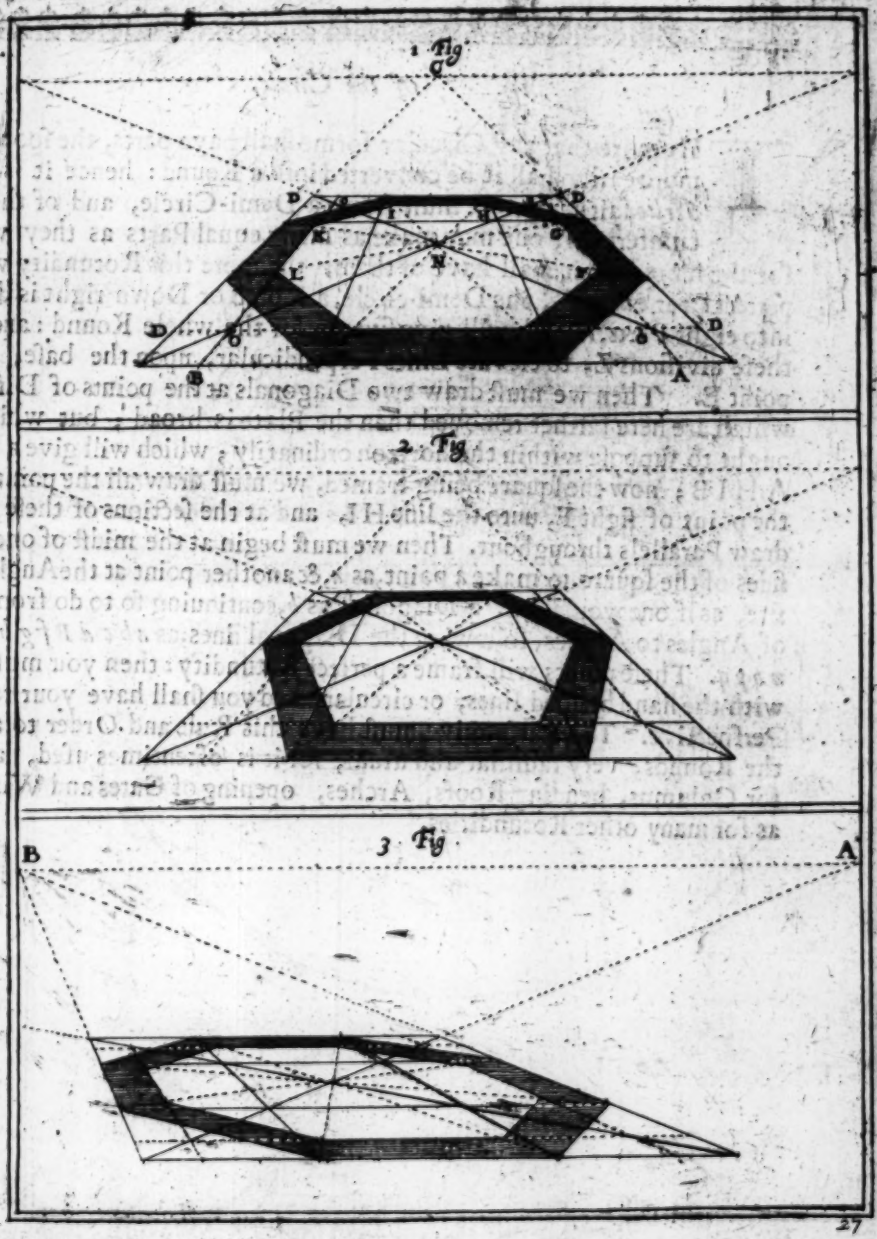
Of the Octogone double.

SUppoſing that we have already made an Octogone ſingle: for to make it double, or to give it a thickneſs or Border, you muſt proceed in this manner. Set ſuch a bredth or thickneſs, as you would give to it, within the ſquare which containeth the Octogone ſingle, as here A B, on one ſide and the other, and draw from theſe points to the point of ſight C. And where theſe lines ſhall Croſs the diagonalls at the point O, draw the Parallells D; The which will make a welt or guard about the ſquare; Then draw from Angles unto Angles occult lines, or points paſſing by the Center N; And where theſe ſhall Croſs or divide the lines of this inward ſquare at the points E F G H I K L M, it ſhallbe the Bounds of the Octogone of the Inſide,

Of the Hexagone double.

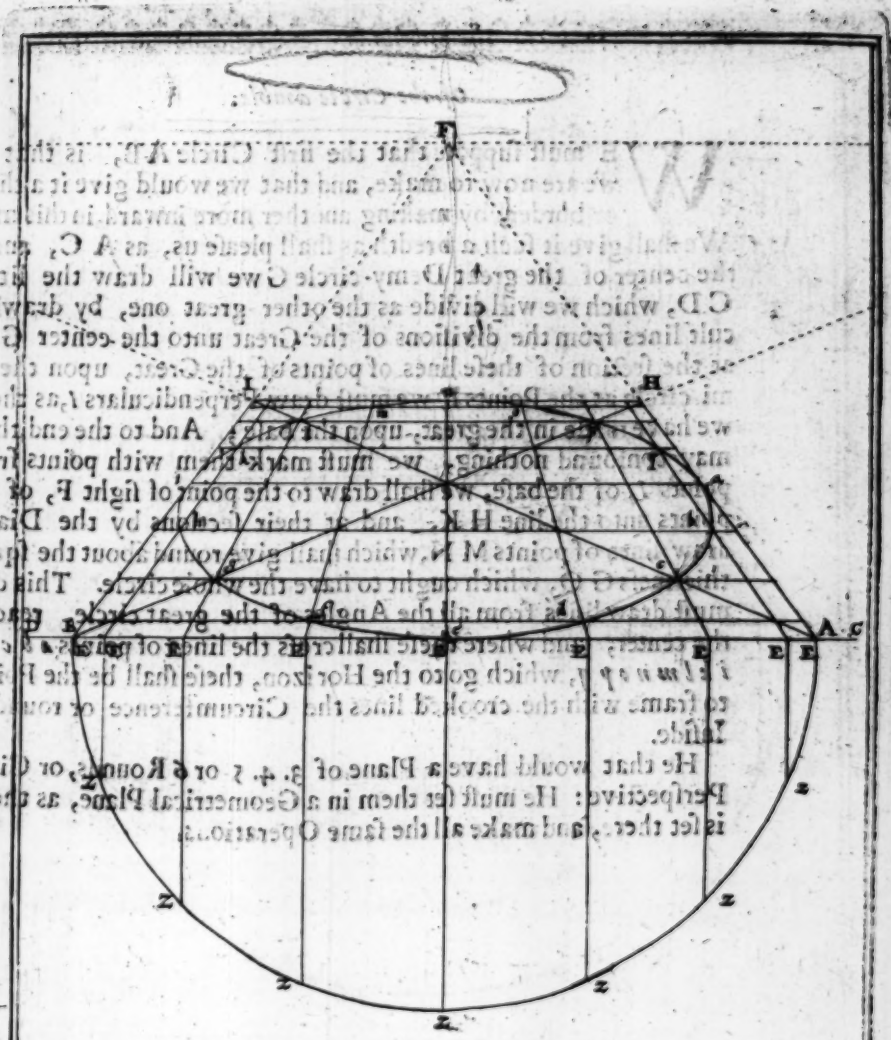
ONe may do the ſame with the *Hexagone* figured within a Square: The which maketh me beleeve, that there is no need to uſe any repetition ſeing that one may ſee by the figure that whereof he might any ways doubt.

The Octogone view'd on the ſide, is all of the ſame frame with that of the front. The point of ſight is A, and that of the diſtance B.


1 Fig
C
D
D
E
F
G
L
N
M
D
D
B
A
2 Fig
3 Fig
B
A

of the Circle.

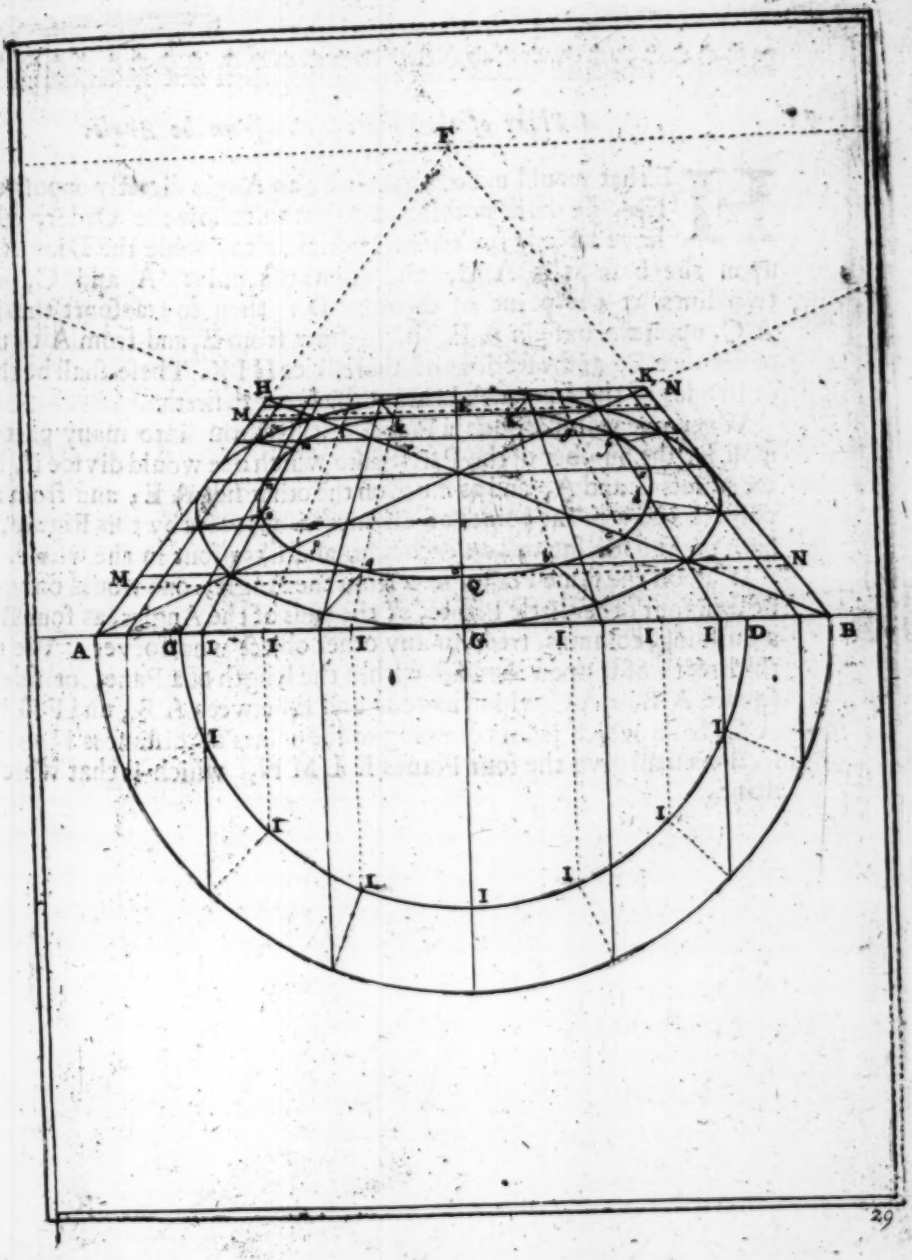
THe more that any Circular forme ſhall have parts, the ſooner and more eaſily ſhall it be converted into a Round: hence it is, that *Serlio* ſaith, that we muſt frame a Demi-Circle, and of this circumference, one may make as many equal Parts as they would: for the more that it ſhall have of them, the more this Rotundity will be perfect: for example, the Demi-circle, a Plomb or Down-right is divided into eight Parts, which will give ſixteen for the whole Round: and from theſe diviſions Z, to elevate Lines Perpendicular, upon the baſe, at the point E. Then we muſt draw two Diagonals at the points of Diſtances, which are here farther removed then the Plate is broad; but which one ought to ſuppoſe within the horizon ordinarily; which will give a ſquare A H I B; now the ſquare being framed, we muſt draw all the points E, at the point of ſight F, unto the line H I, and at the ſections of theſe lines to draw Parallels throughout. Then we muſt begin at the midſt of one of the ſides of the ſquare, to make a point, as *a*, & another point at the Angle oppoſite, as if one would draw a Diagonal, as *b*, continuing ſo to do from points of Angles to Angles, following the Diagonal lines, as *a b c d E f g h i K l m n o p q*. Theſe points will frame a perfect Rotundity: then you muſt bring with the hand bended lines, or circular, and you ſhall have your round in Perſpective. The Perſpective muſt have this Rule and Order to abridge the Rounds, very familiar and uſual, for it is oftentimes uſed, as well for Columns, bending Roofs, Arches, opening of Gates and Windows, as for many other Rotundities.



Of the Circle double.

WE muſt ſuppoſe that the firſt Circle A B, is that which we are now to make, and that we would give it a thickneſs or border, by making another more inward, in this manner: We ſhall give it ſuch a bredth as ſhall pleaſe us, as A C, and from the center of the great Demy-circle G we will draw the little one C D, which we will divide as the other great one, by drawing occult lines from the diviſions of the Great unto the center G. And at the ſection of theſe lines of points of the Great, upon the leſs demi-circle at the Points I, we muſt draw Perpendiculars *I*, as thoſe that we have made in the great, upon the baſe; And to the end, that they may confound nothing, we muſt mark them with points from the points *I*, of the baſe, we ſhall draw to the point of ſight F, of lines of points unto the line H K, and at their ſections by the Diagonals, draw lines of points M N, which ſhall give round about the ſquare the thickneſs G Q, which ought to have the whole circle. This done, we muſt draw lines from all the Angles of the great circle, reaching to the center, and where theſe ſhall croſs the lines of points *a b c d e f g h i k l m n o p q*, which go to the Horizon, theſe ſhall be the Points, for to frame with the crooked lines the Circumference or round of the Inſide.

He that would have a Plane of 3. 4. 5 or 6 Rounds, or Circles, in Perſpective: He muſt ſet them in a Geometrical Plane, as the ſecond is ſet there, and make all the ſame Operations.


F
H
K
N
M
M
N
A
C
G
D
B
L
29

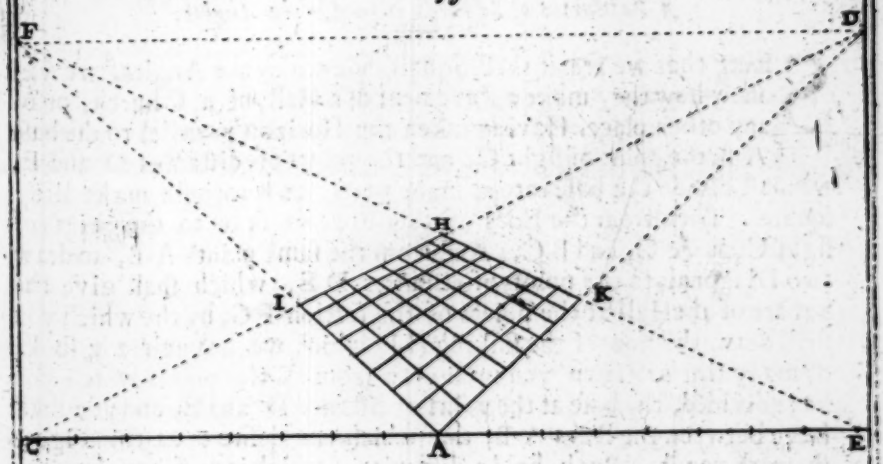
A Plane of the Square view'd from the Angle.

HE that would make a ſquare by an Angle directly oppoſite to the Eye, he hath nothing to do but to follow the Order, which we have already ſpoken of, which is to double the Diameter A B, upon the baſe as is A C, and from the point A and C, to draw two lines at the point of diſtance D: then to tranſport the meaſure A C, upon the baſe in A E, and to draw from E, and from A to the point of diſtance F, at the ſections of theſe lines H I K. Theſe ſhall be the terms or Bounds of the ſquare A I H K, which one deſireth.

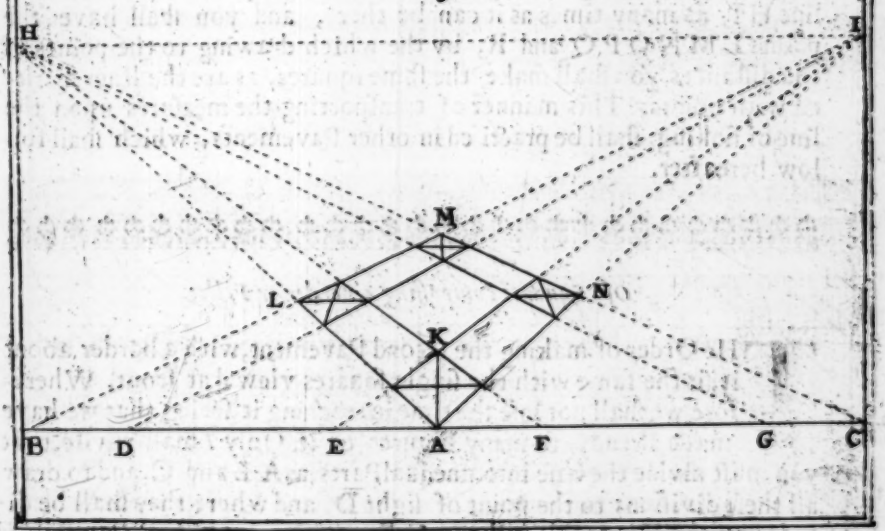
When one would divide a Plane of this form into many parts: We muſt ſet the number of the Parts, into which one would divide it, between the points C and A, and as much on the other ſide A E; and from all theſe points to draw to the points of diſtances, as we ſee by this Figure, which hath eight little ſquares on each ſide, and ſixty four in the whole.

If upon the ſame Plane, ſeen from the Angle, one would only cauſe to be ſeen four other little Planes, at the ends of the Angles, as four Bodies of a Building, columns, trees, or any other object whatſoever: We muſt ſet the bredth of it upon the baſe within the length of a Pane, or ſides of the ſquare A B, or A C, which have D and E between A B; and F G between A C, from which points drawing to the points of diſtances H and I, their ſections ſhall give the four Planes K L M N, which is that which is demanded.

1 fig



2 fig

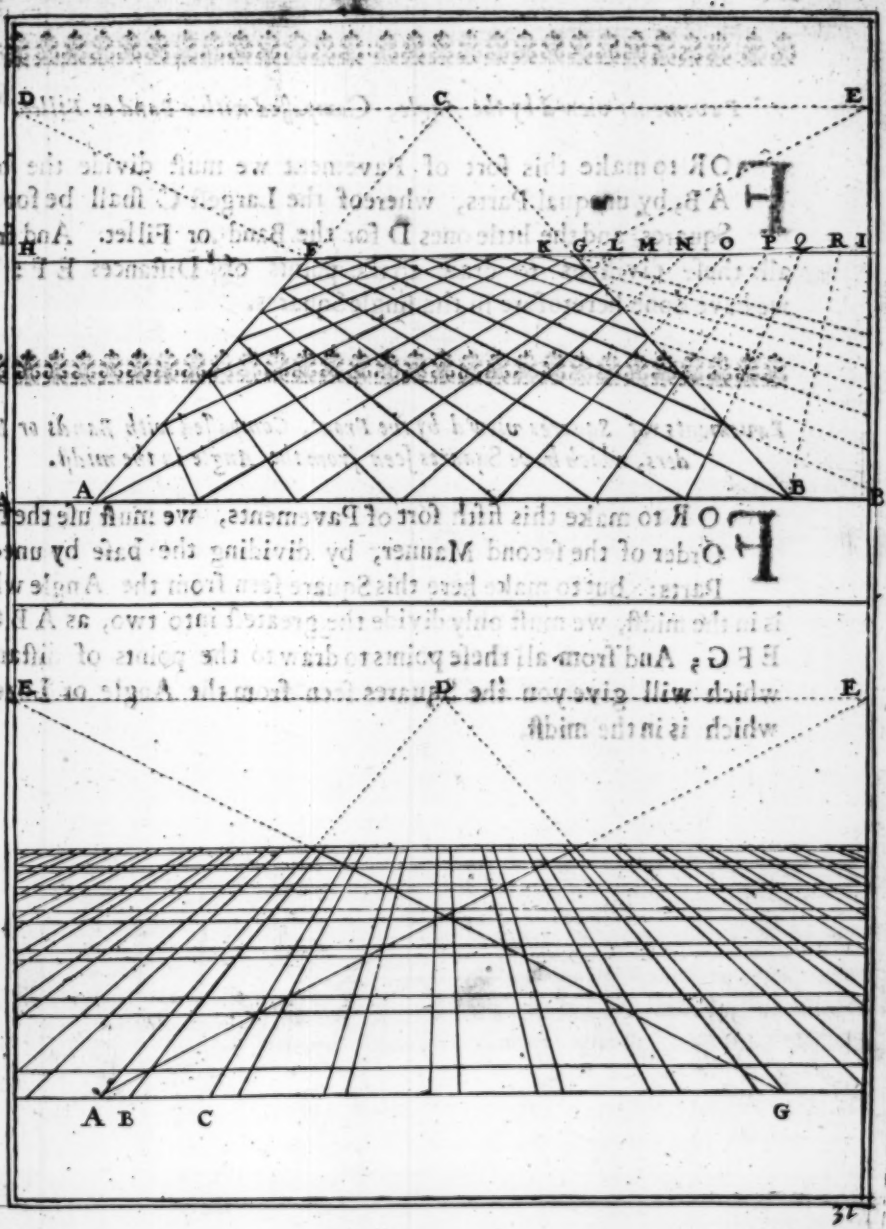


A Pavement of Squares view'd by the Angles,

SEeing that we are at theſe Squares view'd by the Angles, we will ſhew how they make a Pavement of a Hall, of a Church, or of any other place. Having taken the Horizon parallel to the baſe A B, the point of ſight C, and the points of diſtances D and E, we muſt divide the baſe into as many parts, as we would make little ſquares. Then from the Ends of this line, to draw to the point of ſight C, as A C, and B C. And from the ſame points A B, to draw two Diagonals to the points of diſtances D E, which ſhall give the Square of the Hall at the points of the ſections F G, by the which you ſhall draw the line of the ſinking H I, which we have already ſpoke of many times: Then you muſt draw from all the points which you have divided, the baſe at the point of diſtance D and E, and you ſhall have between the Rays A B, that which you deſire; as the Figure ſheweth you it. But behold a difficulty, which is to fill up the place that remaineth B B and G I, A A, and H F, of the ſame ſquares: for *I* ſuppoſe that the baſe cannot reach out it ſelf farther. When this ſhall happen, take upon the line of the ſinking F G, one of the meaſures of the ſquares, as it might be K G, and tranſport it upon the ſame line H I, as many times as it can be there, and you ſhall have the points L M N O P Q and R, by the which drawing to the points of the diſtances you ſhall make the ſame ſquares, as are the lines marked with points. This manner of tranſporting the meaſures upon the line of ſinking, ſhall be practiſed in other Pavements, which ſhall follow hereafter.

Of Squares compaſſing a Border or Fillet.

THe Order of making the ſecond Pavement, with a border about it, is the ſame with the ſingle ſquares view'd at front. Wherefore we ſhall not loſe the time in teaching it, ſeeing that we have made already ſo many Figures of it. Only *I* ſhall adviſe, that you muſt divide the baſe into unequal Parts, as A B and C, and to draw all theſe diviſions to the point of ſight D, and where they ſhall be divided by the Diagonals A E and G F, then to draw lines Parallels to the baſe, as you may ſee in the figure.


D
C
E
H
F
K G L M N O P Q R I
A
B
E
D
E
A B C
G

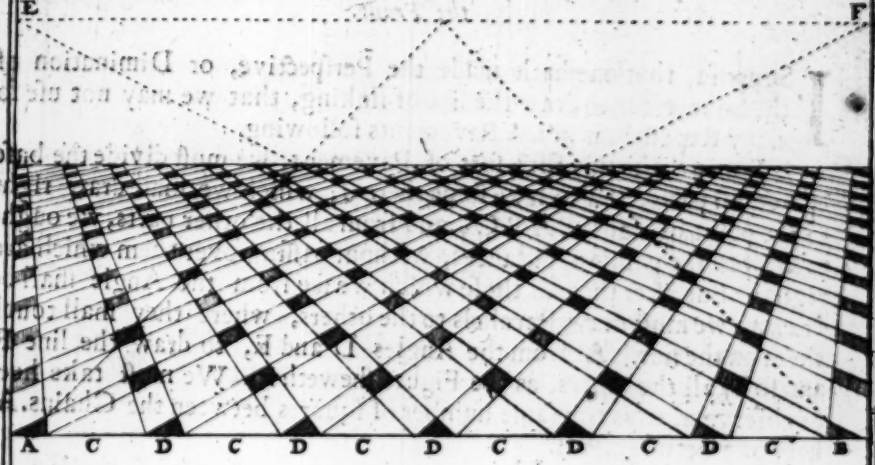
Pavements view'd by the Angle, Compaſſed with a Band or Fillet.

FOR to make this ſort of Pavement we muſt divide the baſe A B, by unequal Parts, whereof the Largeſt C ſhall be for the Squares, and the little ones D for the Band or Fillet. And from all theſe diviſions to draw to the points of Diſtances E F: As we have done heretofore in the ſingle Squares.

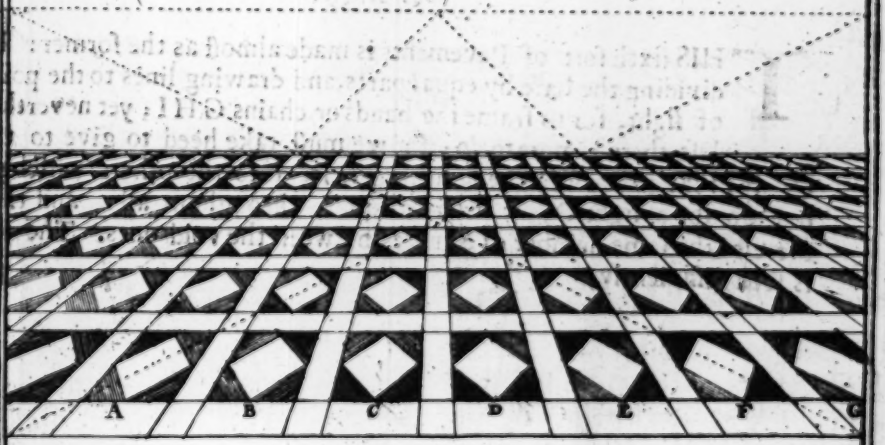
Pavements of Squares view'd by the Front, Compaſſed with Bands or Borders, which have Squares ſeen from the Angle in the midſt.

FOR to make this fifth ſort of Pavements, we muſt uſe the ſame Order of the ſecond Manner, by dividing the baſe by unequal Parts: but to make here this Square ſeen from the Angle which is in the midſt, we muſt only divide the greateſt into two, as A B C D E F G, And from all theſe points to draw to the points of diſtances, which will give you the Squares ſeen from the Angle or Lozenge which is in the midſt.

1 fig.



2 fig.



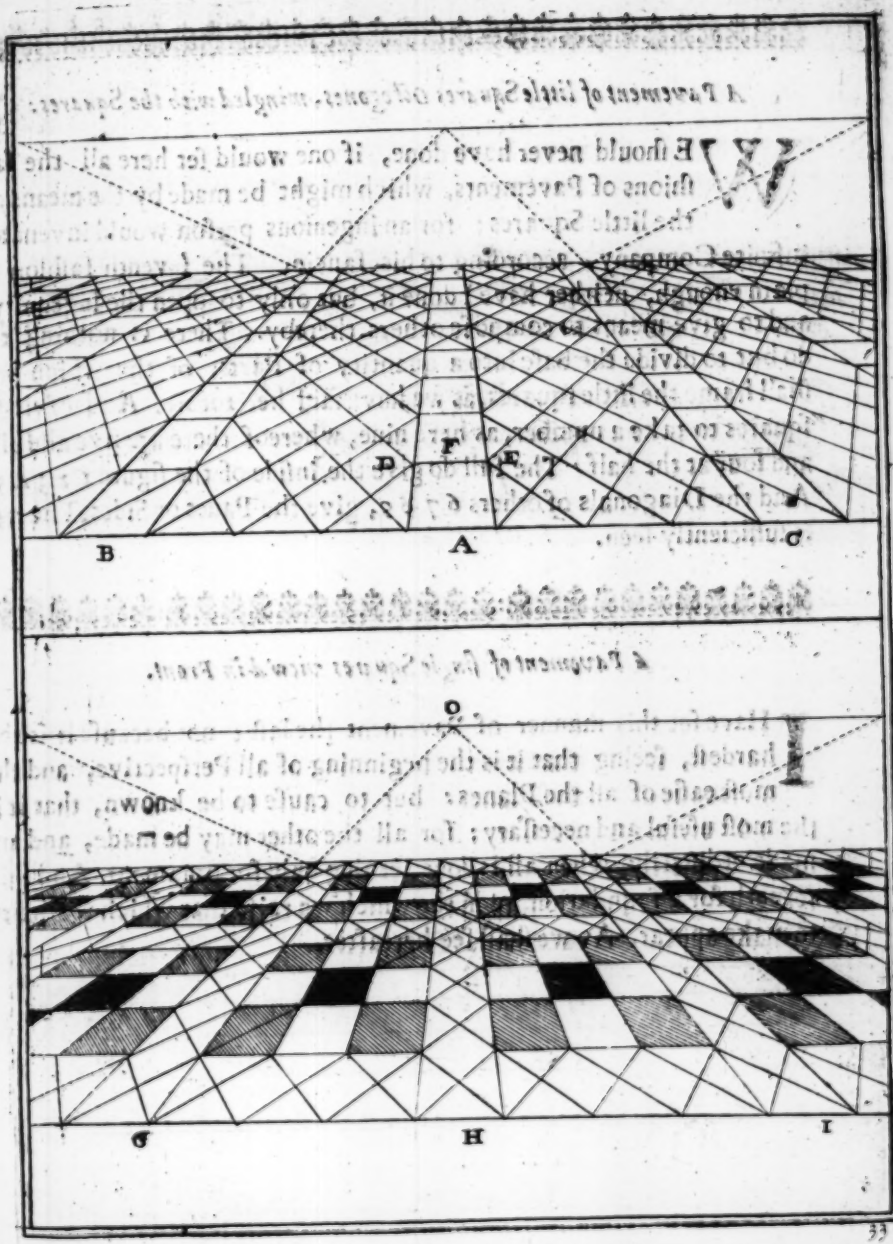
A Pavement of Squares ſeen from the Angle, with Chains of Squares on the Front.

I Suppoſe, that one hath made the Perſpective, or Diminution of the Square for to draw the line of ſinking, that we may not uſe ſo many Repetitions in the Pavements following.

For to make this fifth ſort of Pavement, we muſt divide the baſe into equal parts, and to take ſome thereof, which we ſhall draw right to the point of ſight as A B C; and from all the other parts, we ought to draw to the points of diſtances, without paſſing over them which are right: But after that all theſe which we ſee from the Angle ſhall be drawn, we muſt draw Parallels to the others, where they ſhall touch them on the ſide. As from the Angles D and E, to draw the line F, and ſo by all the others, as the Figure ſheweth it. We muſt take heed to obſerve always the ſame number of ſquares between the Chains. As here of 3 between A B.

A Pavement of Squares in Front, with Chains of Squares ſeen from the Angle.

THIS ſixth ſort of Pavements is made almoſt as the former: by dividing the baſe by equal parts, and drawing lines to the point of ſight, for to frame the bands or chains G H I; yet nevertheleſs there is more to do; for we muſt take heed to give to the Chains that go acroſs, the ſame largeneſs, as to the others which go to the point of ſight O, which is a ſquare throughout all: and that there be the ſame number of Squares between the void ones. The reſt is ſeen ſufficiently.


B
A
C
D
F
E
O
G
H
I

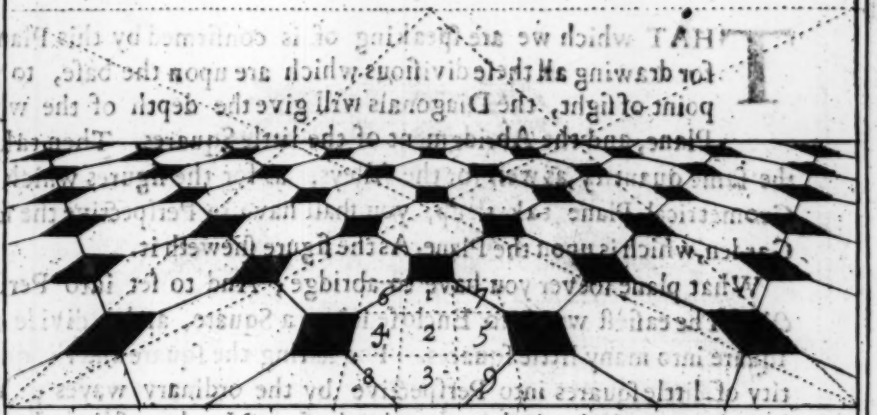
A Pavement of little Squares Octogones, mingled with the Squares:

WE should never have done, if one would set here all the fashions of Pavements, which might be made by the means of the little Squares: for an ingenious person would invent an infinite Company, according to his fancie. The seventh fashion is plain enough, neither have I done it, but only to open the Ingenuity, and to give means to compose others thereby. There is nothing to do but to divide the base into a quantity of Parts, of the which we shall frame the little Squares, as we have said heretofore. And of these squares to take a number, as here nine, whereof there are five all full, and four at the half. The full do give the inside of the figure 1 2 3 4 5. And the Diagonals of others 6 7 8 9, give the Panes or Sides. The rest is sufficiently seen.

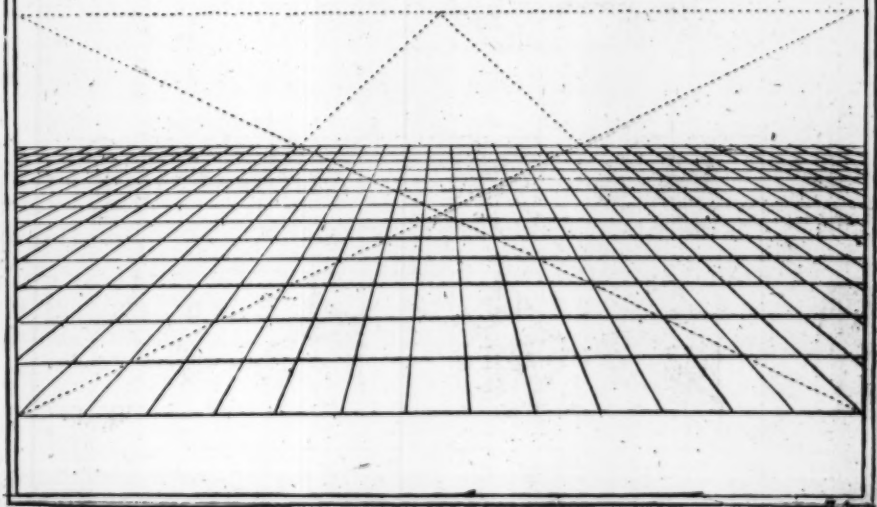
A Pavement of single Squares view'd in Front.

I Have set this manner of Pavement the last; not because it is the hardest, seeing that it is the beginning of all Perspective, and the most easie of all the Planes: but to cause to be known, that it is the most useful and necessary; for all the other may be made, and are made ordinarily, when all is done, serving only for ornament. And this serveth for a foundation, upon the which we raise that which we desire to make appear. As we shall see hereafter.

1 fig.



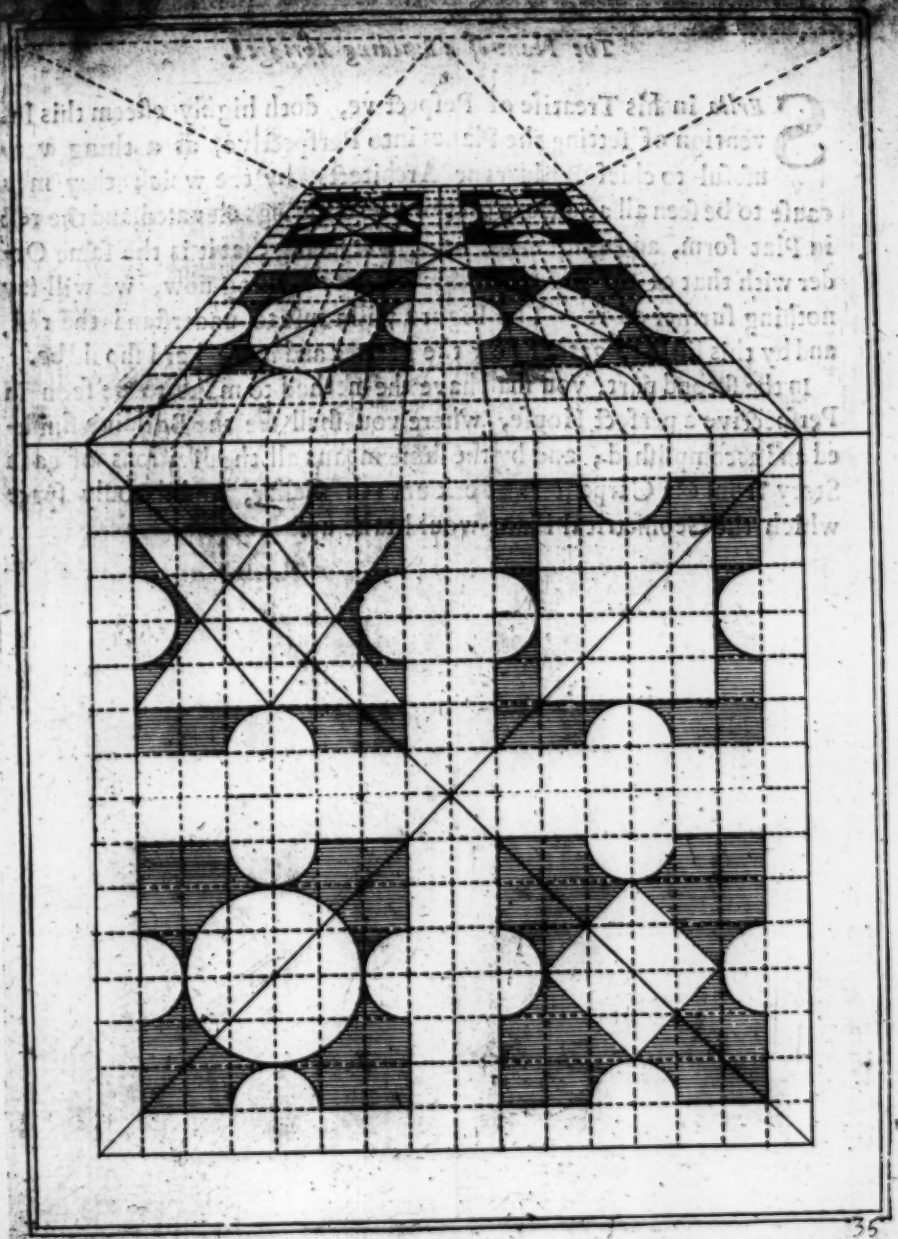
2 fig.



The Plane of a Garden abridged.

THAT which we are ſpeaking of is confirmed by this Plane; for drawing all theſe diviſions which are upon the baſe, to the point of ſight, the Diagonals will give the depth of the whole Plane, and the Abridgment of the little Squares. Then taking the ſame quantity, as well for the Alleys, as for the figures which the Geometrical Plane taketh up, you ſhall have in Perſpective the ſame Garden, which is upon the Plane; As the figure ſheweth it.

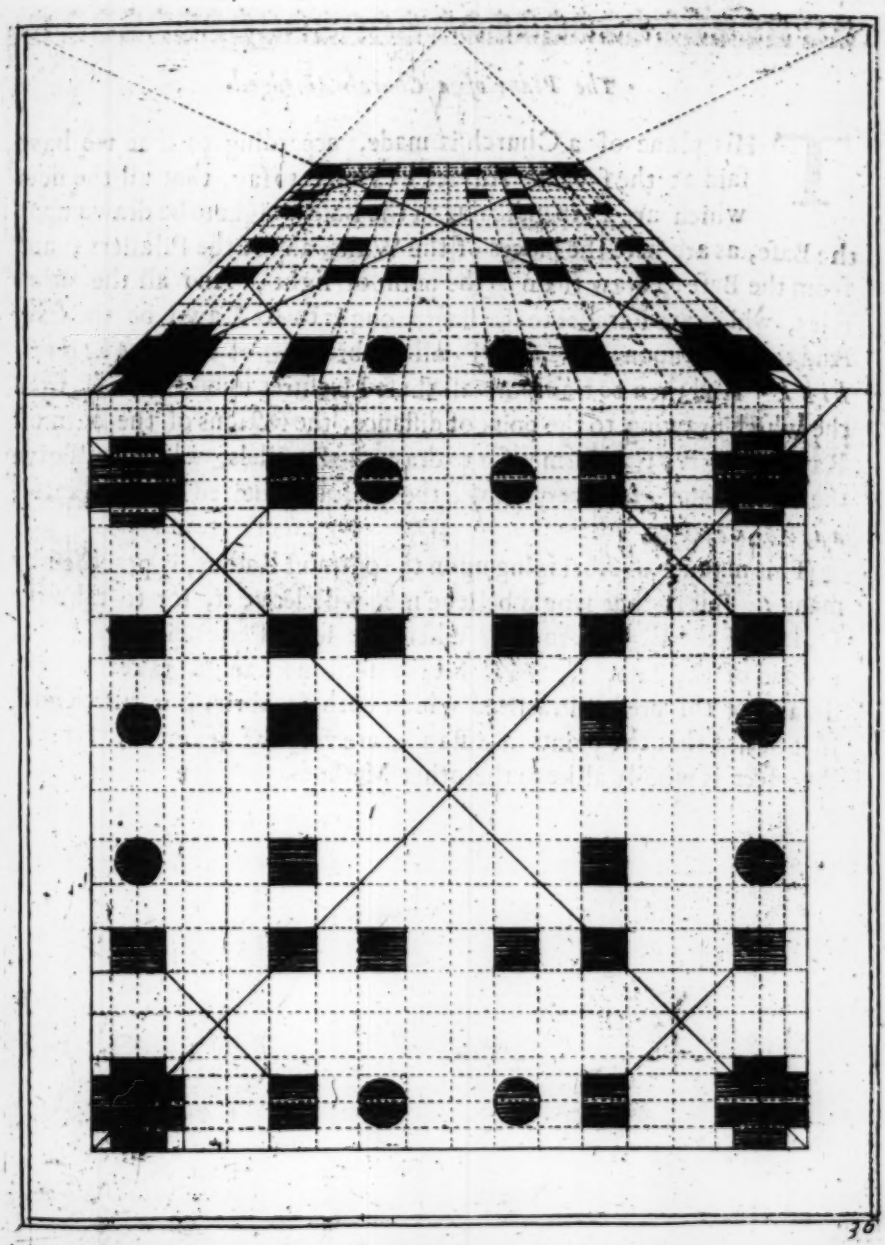
What plane ſoever you have to abridge; And to ſet into Perſpective: The eaſieſt way is to Encloſe it into a Square, and to divide this ſquare into many little ſquares. For ſetting the ſquare and the quantity of little ſquares into Perſpective by the ordinary wayes; You have but to take heed, that you take the ſame Number of little ſquares in the Plane abridged, as in the Geometricall Plane; And you ſhall make in the one, the figure of the other.



The Plane of a Building Abridged.

Serlio in his Treatiſe of Peſpect.ve, doth highly eſteem this Invention of ſetting the Planes into Perſpective, as a thing very uſeful to chief Builders or Architects, by the which they may cauſe to be ſeen all at once a part of the buildings elevated, and the reſt in Plat-form, and as upon the baſe: But ſeeing that it is the ſame Order with that of the Garden, which we are making now, we will ſay nothing further of it. The Figure will cauſe to underſtand the reſt, and by this little to gather how the greater and more hard ſhould be.

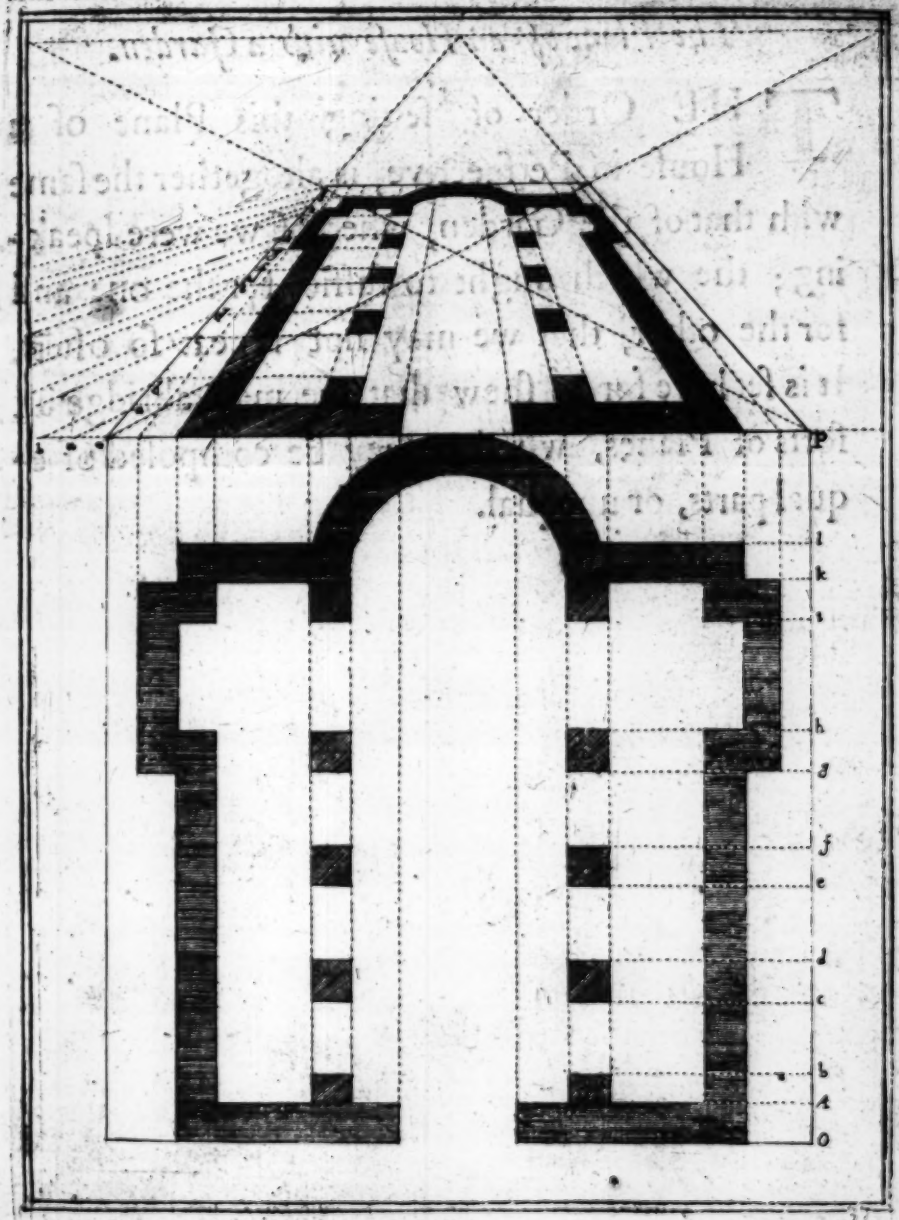
In the ſecond part, you ſhall have the method to make to be ſeen in Perſpective a perfect Houſe, where you ſhall ſee the Building finiſhed and accompliſhed; and by the ſame means all the diviſions of each Story from the Carpenters Work unto the Cellar, and the only ſpace which the Geometrical Plane would take up.



The Plane of a Church Abridged.

THis plane of a Church is made, according to that we have ſaid at the ſeventh Advice; That is to ſay, that all the ſides which are Perpendicular to the Baſe, ought to be drawn upon the Baſe, as are here the places of the Walls, and of the Pilaſters; and from the Baſe to draw them to the point of ſight; And all the other ſides, which are Parallel to the Baſe, ought to be drawn on the ſide: And to mark upon a line as O P, all the bredths, as we ſee *A b c d e f g h i k l.* And then to tranſport all theſe Meaſures upon the Baſe, from the which drawing to the point of diſtance, the ſections of the outmoſt Raye will give the Termes for to draw the Parallels, which will give the Abridgement of every thing, the which is ſhewed by the Letters *a a, b b, c c, &c.*

This manner of Abridging upon the outmoſt Radius, is practiſed by many; But he that would believe me, will leave it, for to take the Orders of the Eighth Advice, where we ſet a Perpendicular line at the end of the Baſe, for to receive the ſections, and to take away the default of this preſent Practice, which doth not abridge it ſufficiently, if it be not that the points of diſtances are very far removed, for then the effect is wholly alike to the other Methods.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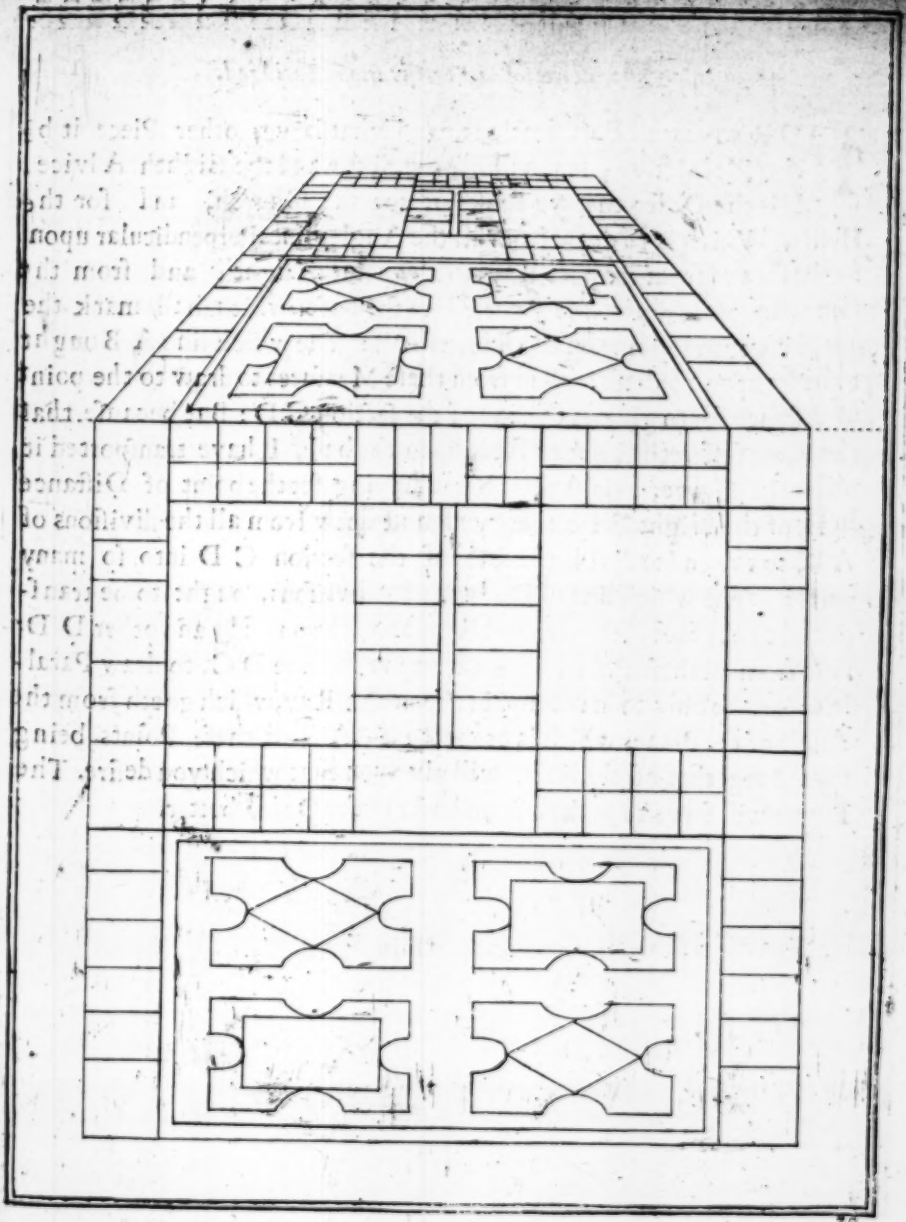
O

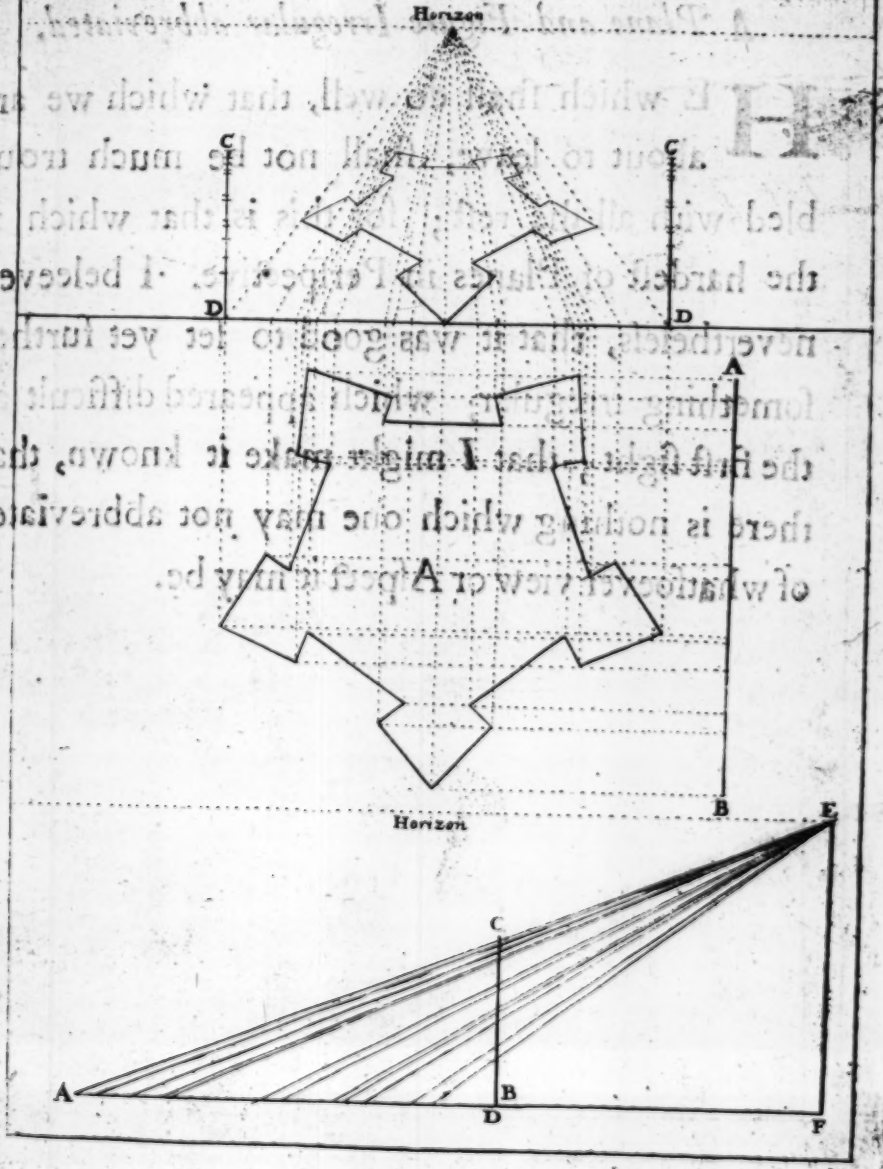
The Plane of an Houſe with a Garden.

THE Order of ſetting this Plane of a Houſe in Perſpective, is altogether the ſame with that of the Garden, whereof we were ſpeaking; the which ought to ſuffice for the one and for the other; that we may not repeat ſo often. It is ſet here for to ſhew that one may abridge all ſorts of Planes, whether they be compoſed of equal parts, or unequal.



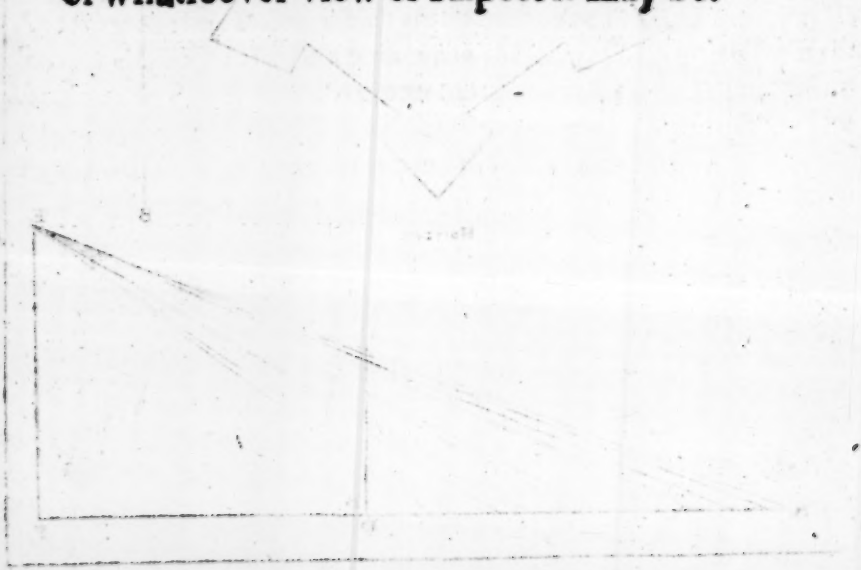
FOR to ſet all Fortifications, and whatſoever other Piece it be into Perſpective; we muſt uſe the Sixth and the Eighth Advice.

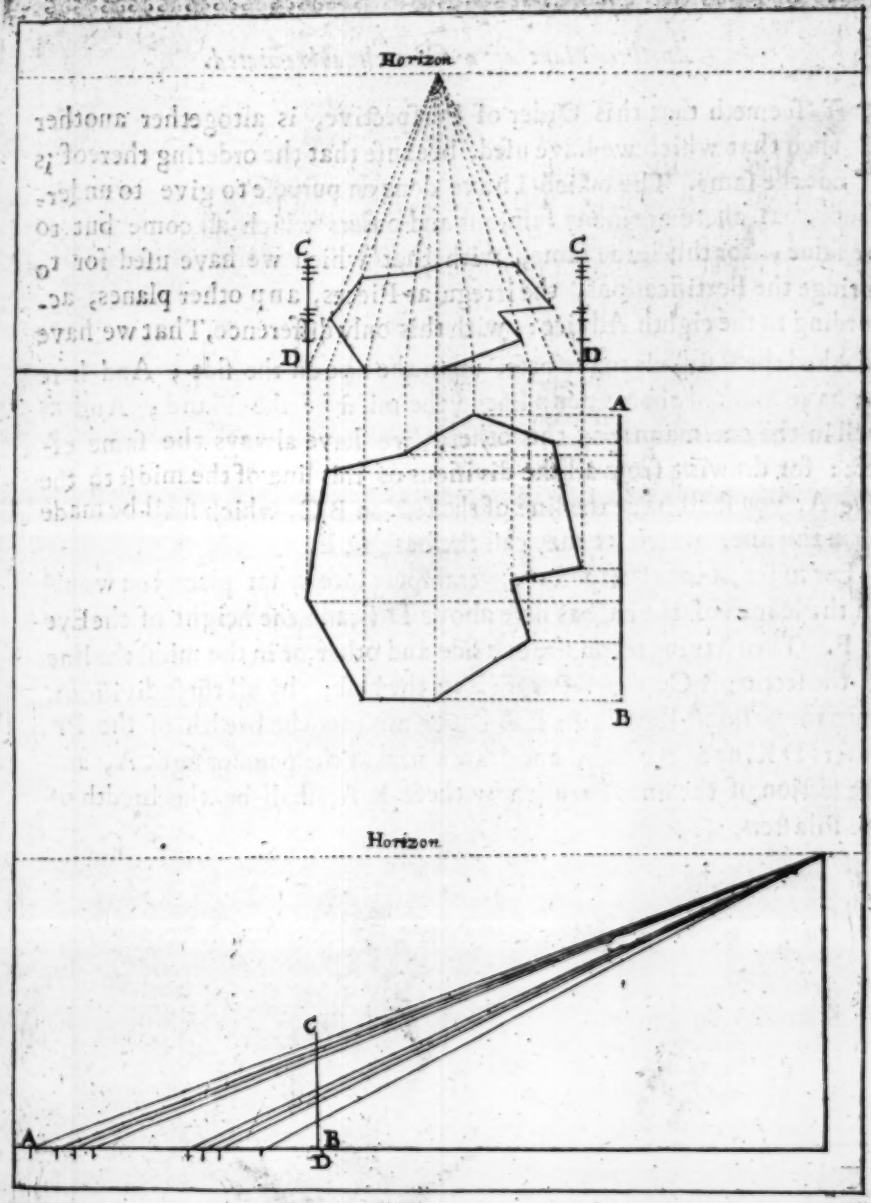
It is the Order that we ſpake of for the Church, and for the Houſe. Which is to draw from all the Angles lines Perpendicular upon the baſe, and from the baſe Rays to the point of ſight; and from the ſame Angles to draw alſo Parallels to the baſe, which ſhall mark the diviſions upon the line on the ſide, as A B: The which line A B ought to be ſet upon the baſe: And from theſe Meaſures to draw to the point of diſtance for to give us the line of the ſection C D: But becauſe that the Place ſuffereth us not to ſet it upon the baſe, I have tranſported it under the Figure, as is A B. Then having ſet the point of Diſtance in E, of the height E F: there you muſt draw from all the diviſions of A B, to the end to divide the line of the ſection C D into ſo many parts: The which line C D, with its diviſions, ought to be tranſported to the foot of the outmoſt Ray, or on the one ſide and other D D: And from all theſe Points which are upon the line D C, to draw Parallels: or elſe only to mark a point upon the Ray, which goeth from the Angle of the Plane, which is proper to it; And all theſe Points being joyned together of the lines, will give you that which you deſire. The Figure will ſerve to make one underſtand the Order better.


Horizon
C
C
D
D
A
B
E
Horizon
C
A
B
D
F

A Plane and Figure Irregular abbreviated.

HE which ſhall do well, that which we are about to leave, ſhall not be much troubled with all the reſt; for this is that which is the hardeſt of Planes in Perſpective. I beleeved nevertheleſs, that it was good to ſet yet further ſomething irregular; which appeared difficult at the firſt ſight; that *I* might make it known, that there is nothing which one may not abbreviate, of whatſoever view or Aſpect it may be.

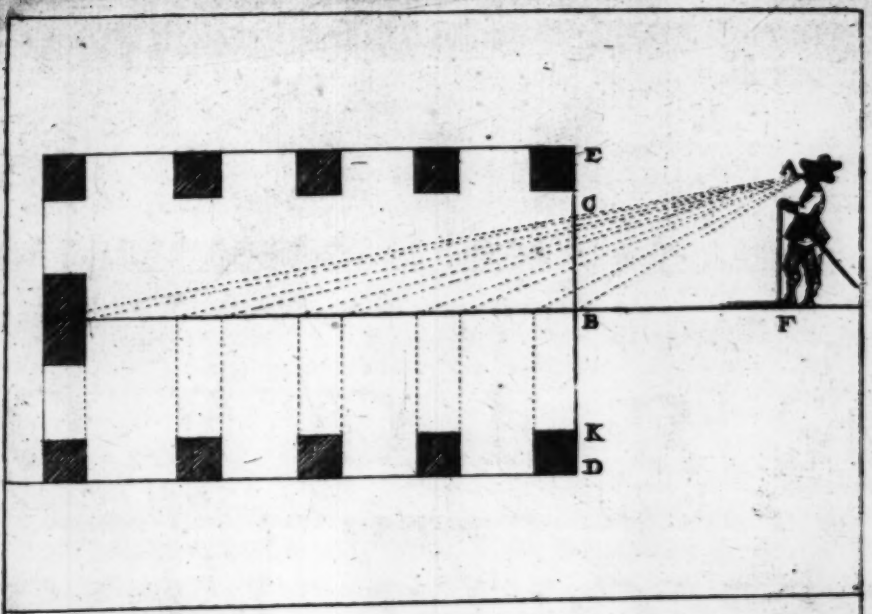


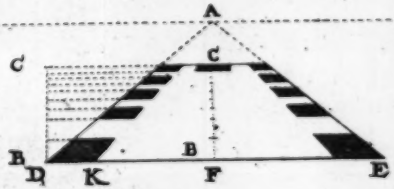

Horizon
C
C
D
D
A
B
Horizon
C
A
B
D

Another Plane of a Church abbreviated.

IT ſeemeth that this Order of Perſpective, is altogether another then that which we have uſed, becauſe that the ordering thereof is not the ſame. The which I have done on purpoſe to give to underſtand, that there are many faſhions and orders which all come but to the ſame; for this is the ſame, with that which we have uſed for to abridge the Fortifications, the irregular Pieces, anp other planes, according to the eighth Advice: with this only difference, That we have marked the Parallels to the baſe, upon the line on the ſide; And here we have marked them upon a line in the midſt of the Plane; And as well in the one manner as the other, we have always the ſame effect: for drawing from all the diviſions of this line of the midſt to the Eye A, you ſhall have the line of the ſection B C, which ſhall be made upon the line, which we may call the baſe D E.

For to ſet it into Perſpective, tranſport into what place you would all the length of the baſe as here above D E, and the height of the Eye A F. Then having ſet on the one ſide and other, or in the midſt the line of the ſection B C, draw Parallels to the baſe, by all theſe diviſions, unto the outmoſt Ray D A, E A; you muſt ſet the bredth of the Pilaſters D K, upon the baſe, and draw a line at the point of ſight A, and the ſection of the lines Parallels by theſe K A, ſhall be the bredth of the Pilaſters.


E
C
B
F
K
D


A
C
C
B
B
D
K
F
E

THE ORDERS OF THE ELEVATIONS.

Some Neceſſary Advice, for the Orders following.

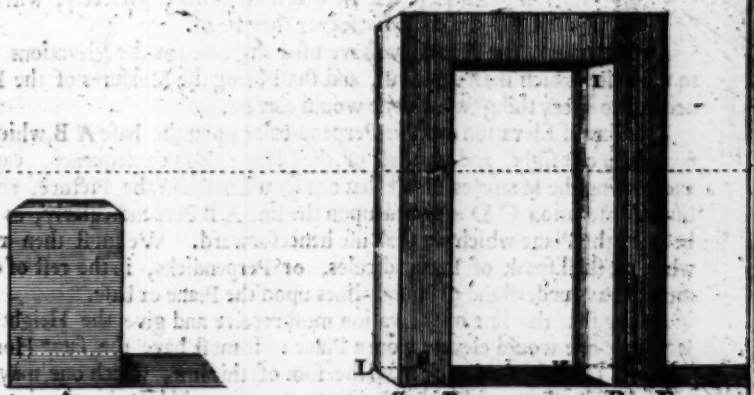
IT ſeemeth to me that I have given ſufficiently to underſtand that which belongeth to the Ichnography, and Planigraphy, or deſcription of Planes, which is neceſſary for the foundation of Orthography and Scenography. The Orthography is the face, or fore-part &c. As one may ſee in the Definitions. Scenography, is the Elevation of all that which any one hath a deſigne to make &c. See the Definitions which are at the beginning of this Book.

For to make this more clear to thoſe that are not acquainted with theſe words; we ſhall Name hereafter (as I ſaid already in the Definitions) the Ichnography, the Plane, and the Orthography, and Scenography, by a Word common to the one and the other, - the Elevation: So that, inſtead of ſaying the Orthography, we ſhall ſay the Elevation of the fore-part; And ſo Srcenography, the Elevation of the whole.

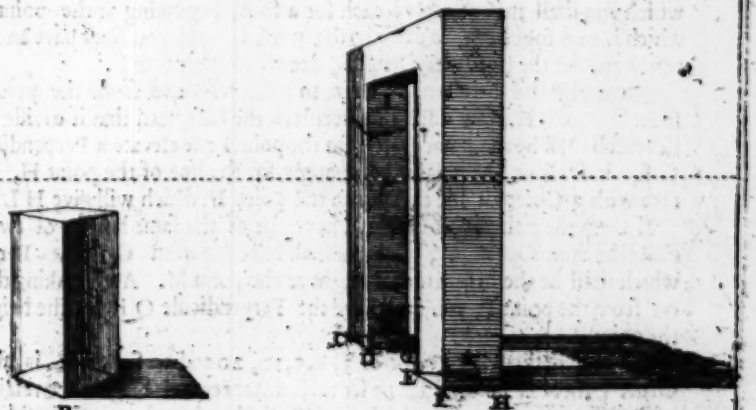
Before we paſs any further it muſt be obſerved, that the Elevations do never give to the eye all the Angles of the Plane, and the Quantity of faces depend on the Aſpect, which cauſeth the object to be ſeen: for if it be ſeen on the front as the figure A, it will ſhew but one face, although that the Plane have four; If it be view'd from the Angle, although on the front it will ſhew two, as B, and never more, with what Aſpect ſoever one look on it. This ought to be underſtood of a ſquare, ſeeing that figures with divers Panes, may give thereof 3 4 5 and more. Now it is, that if the objects decline a little from the point of ſight, they are ſeen from the Angle, whence they ought to ſhew two faces; And the further they are removed from the point of ſight, the more they are diſcovered. As K E are more diſcovered then C L, although their thickneſs be equal.

Another thing alſo that is further to be marked is, That which is Parallel to the Horizon, when the object is view'd in front, although in Perſpective, as C D E F from the Gate in the firſt figure, becometh a viſual Ray; when the ſame object is view'd being in a Return, or obliquely. As in the ſecond figure, that C D E F, which is in the front above, is made a viſual Ray to that which is under: And on the contrary, that which is a Ray to that above, is made a Parallel to the baſe to that below, as D G F H L. The Perpendiculars are always Perpendiculars.

1 Fig



2 Fig



M

Of the Line of Elevation for to give the Heights to all kinde of Bodies and Figures, and in ſuch a Place as one would within a Plane.

WE muſt endeavor to underſtand well, and remember this Rule: which is of ſuch importance, that he that ſhall know it perfectly, will not be troubled in the Elevations, whatſoever they be of.

As for to make the Planes, we have uſed the baſe for the Elevations: we ought alſo to uſe a line which ſhall direct us, and ſhall bring the Meaſures of the Heights that are needful to every thing which one would elevate.

This line of Elevation muſt be Perpendicular upon the baſe A B, which is always the neareſt to our ſight, and the firſt of the Plane: By conſequence, capable of giving and bearing the Meaſures of all that one would make in the Picture, and therefore the line of Elevation C D is placed upon the line A B Perpendicularly, as all thoſe muſt be upon the Plane which we ſhall uſe henceforward. We muſt then remember, that when we ſhall ſpeak of Perpendicules, or Perpendicks, in the reſt of our Orders, we muſt always underſtand of Plumb-lines upon the Plane or baſe.

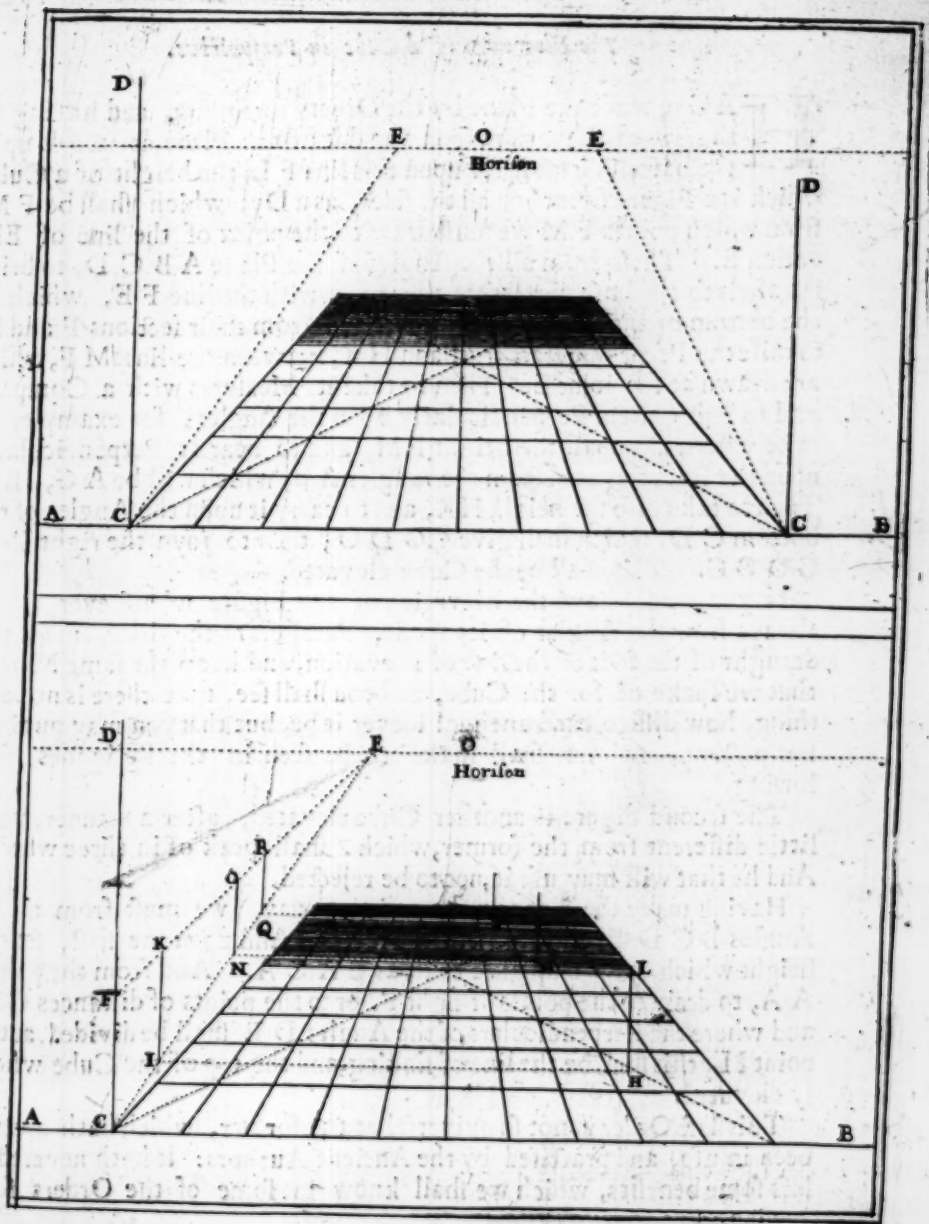
Seeing that this line of Elevation muſt receive and give the Heights to all the Objects that one would elevate from a Plane: it muſt have the ſame Horizon with the Plane. Therefore we muſt from the foot of this line, which one may ſet on the left or right ſide, draw within the Horizon, as one would have it, that is to ſay, that it is no great matter where the Point be ſet within the Horizon: for in what place ſoever it be, it will always give the ſame effect, as it is from the foot of the line C to the point E, one may ſet it at the point of ſight, if one will. I have ſet this line on the one ſide and other in the firſt Figure, and their point different within the Horizon, for to give to underſtand that it is well throughout.

If from the point H, which is in the Plane of the ſecond Figure, you would elevate a line of two foot high; you muſt ſet upon the line of Elevation two equal Parts, which you ſhall make to ſerve each for a foot, beginning at the point C, as are C F, which is two foot high, to draw to the point E, and you ſhall have an Elevation of two feet, between the two lines C and F, drawn to the point E.

For to give the height of two feet to a line elevated from the point H: you muſt from the point H draw a Parallel occult to the baſe, until that it divide the line below C E, which ſhall be the point I. If from the point I one elevate a Perpendicule I K, between C F, it ſhall be the height that it ought for the line of the point H, which you muſt take with a Compaſs and carry it to the point H, which will give H L of two feet high.

If from the point M, you would have one of the ſame height of two feet, you muſt make the ſame Operation, and you ſhall have between C F the Perpendicule N O, which ſhall be the height that it ought at the point M. And making the ſame Operation from the point P, you ſhall have the Perpendicule Q R, for the height of the line of the point P.

For to give them the height of 3, 4, 5, 10, 20 and 30 feet. It is always the ſame Order; there is nothing but to ſet theſe diſtances and heights aboveſaid upon the line of the Elevation. And from the point of the height, that you would give to draw to the point of the line within the Horizon, which is here the point E, and to make all the ſame Operations, which we are about making: and you ſhall have that which you deſire.


D
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Horiſon
D
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Horiſon
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The Elevation of a Cube in Perſpective.

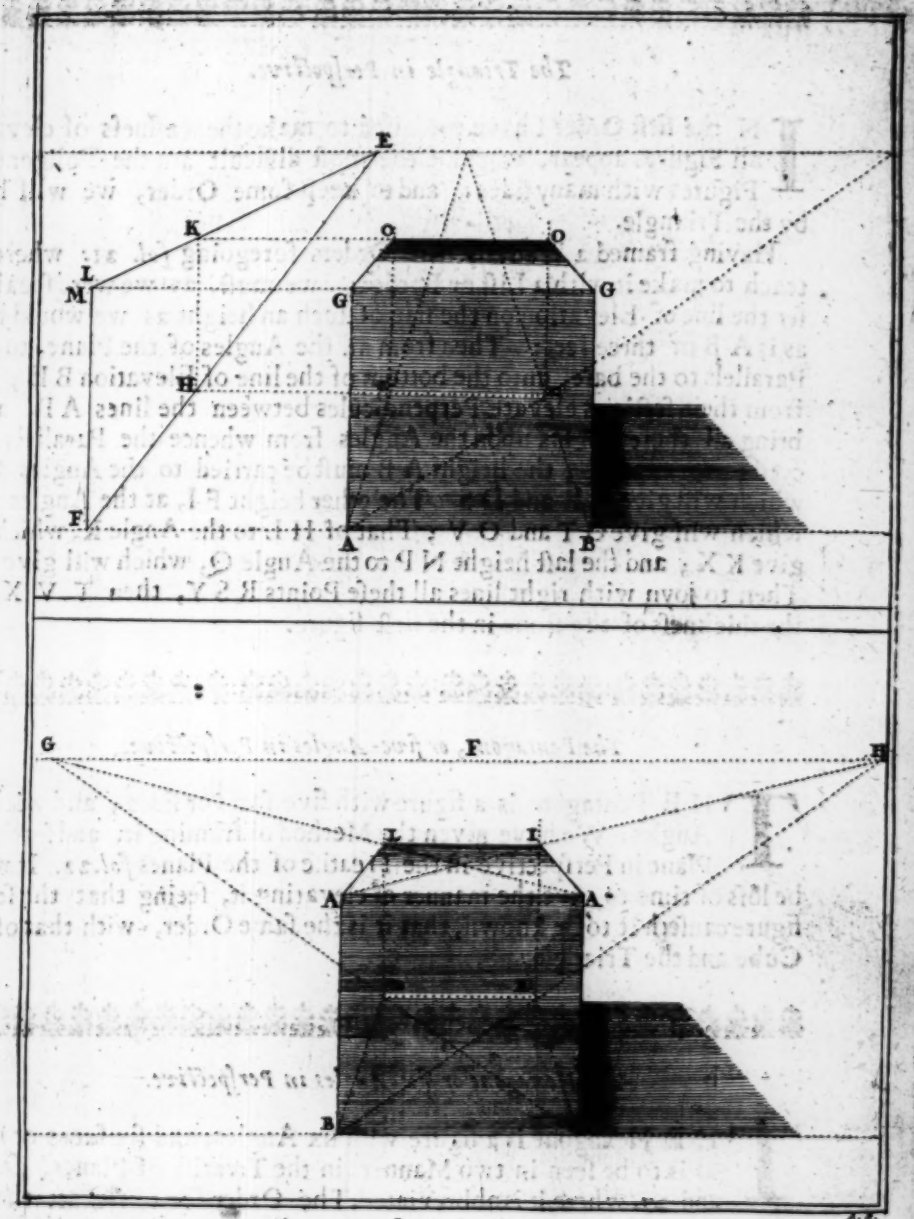
HAving made the Plane by the Orders foregoing, and having ſet the line of Elevation upon any ſide of the Plane, as is F L upon the baſe; We muſt ſet upon this line F L, the height of a Cube, which is a Figure ſquare on all the ſides, as a Dy, which ſhall be F M, from which points F M we muſt draw to the point of the line of Elevation E. Then from all the Angles of the Plane A B C D, to bring Parallels to the baſe, until that they meet with the line F E, which is the bottom of the line of Elevation, and from their ſections F and H, to raiſe the Perpendiculars F M and H K, between the lines M F, which are drawn at the point E. Then to take its Meaſures with a Compaſs, and to bring them Perpendicularly upon the Angles; for example, to take with a Compaſs the height F M, and to bear it Perpendicularly upon the lines elevated from the Angles A B, which will be A G, B G. Then to take alſo the height H K, and to carry it upon the Angles of the bottom C D, which ſhall give C O D O; then to joyn the right lines G O O G. This ſhall be the Cube elevated.

If you would have the Elevation of any Figure whatſoever, draw always from the Angles of its Plane, Parallels to the baſe, unto the draught of the foot of the line of Elevation, and keep the ſame Method that we ſpake of for the Cube, and you ſhall ſee, that there is not any thing, how difficult and unequal ſoever it be, but that you may put into Perſpective; as we ſhall make to be ſeen in the Poligones following.

The ſecond Figure is another Cube elevated, after a manner, very little different from the former, which *I* ſhall ſpeak of in three words; And he that will may uſe it, not to be rejected.

Having made the Plane by the ordinary way, we muſt from all its Angles B C D E, elevate Perpendiculars; And upon the firſt, ſet the height which one would give to it, as B A C A. And from the points A A, to draw to the points of ſight F, or to the points of diſtances G H, and where the Perpendiculars of the Angles D E ſhall be divided at the point I L, this ſhall be the line of ſinking, and the top of the Cube wholly elevated.

This laſt Order is not ſo univerſal as the former, which hath always been in uſe, and practiſed by the Ancient Authors: It hath nevertheleſs ſome benefits, which we ſhall know in ſome of the Orders following.


E
K
O
O
L
M
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G
H
F
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L
E
A
A
B

The Triangle in Perſpective.

IN the firſt Order I have promiſed to make the eaſineſs of elevating all Figures appear, whereof the moſt difficult are the Poligones or Figures with many ſides: and to keep ſome Order, we will begin by the Triangle.

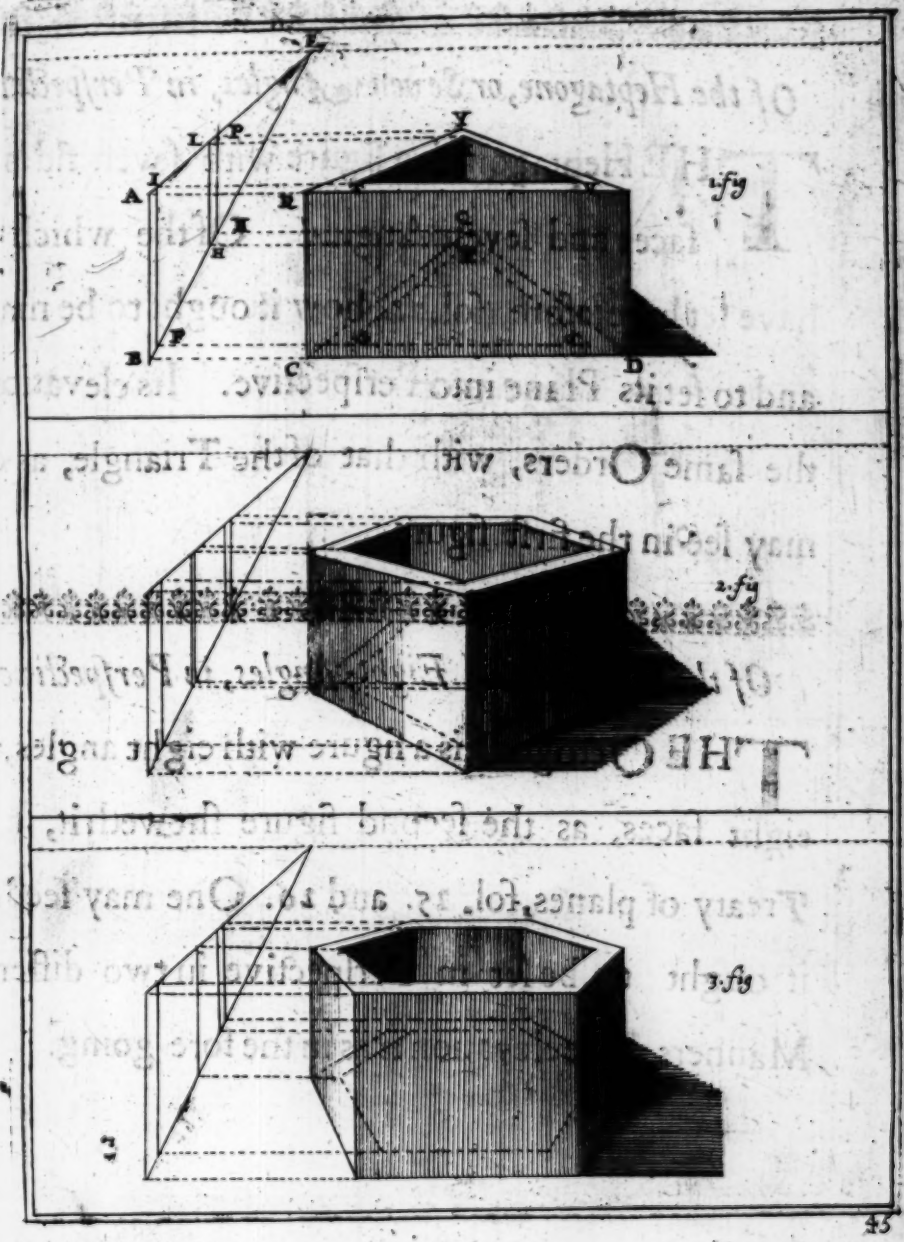
Having framed a Plane by the Orders foregoing *fol.* 21: where we teach to make it with a Liſt or Border: we muſt, as we were ſpeaking, ſet the line of Elevation on the ſide of ſuch an height as we would have, as is A B of three feet: Then from all the Angles of the Plane, to draw Parallels to the baſe, unto the bottom of the line of Elevation B E; And from their ſections elevate Perpendicules between the lines A B, and to bring all theſe heights upon the Angles from whence the Parallels proceed; for example, the height A B muſt be carried to the Angles C D, which will give C R and D S. The other height F I, at the Angles G O, which will give G T and O V; That of H L to the Angle K, which will give K X; and the laſt height N P to the Angle Q, which will give Q Y. Then to joyn with right lines all theſe Points R S Y, then T V X, for the thickneſs of the ſtone in the firſt figure.

The Pentagone, or five-Angles in Perſpective.

THE Pentagone is a figure with five faces or ſides; and with five Angles. We have given the Method of framing it, and ſetting its Plane in Perſpective in the Treatiſe of the Planes *fol.* 22. It would be loſs of time to give the manner of elevating it, ſeeing that the ſecond figure cauſeth it to be known, that it is the ſame Order, with that of the Cube and the Triangle.

The Hexagone or ſix-Angles in Perſpective.

THE Hexagone is a figure with ſix Angles, and ſix faces or ſides, as is to be ſeen in two Manners in the Treatiſe of Planes, *fol.* 23. and 27. where it is abbreviated. The Order for to elevate them is to be ſeen ſufficiently in the third figure.

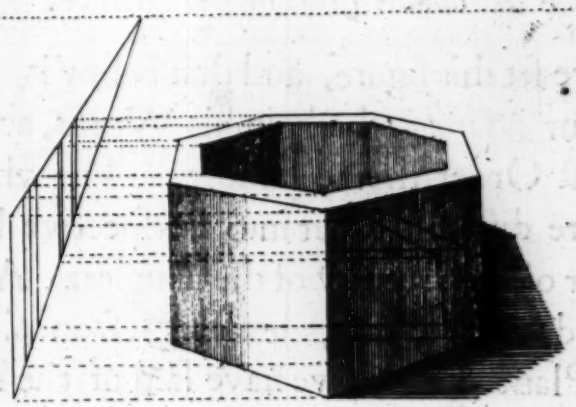

1.fig
2.fig
3.fig

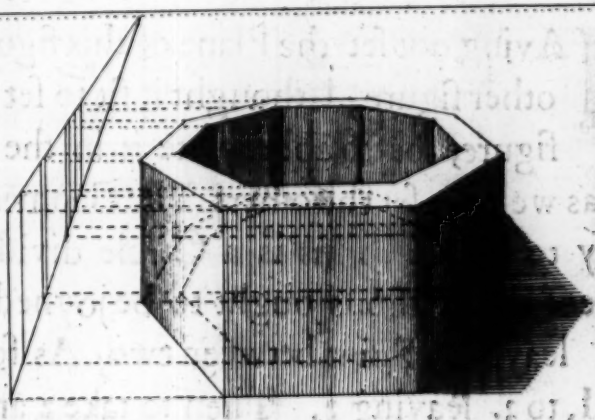
Of the Heptagone, or Seven-Angles, in Perſpective.

THE Heptagone is a figure with ſeven ſides or faces and ſeven Angles. Of the which we have ſet heretefore, fol. 24, how it ought to be made, and to ſet its Plane into Perſpective. Its elevation is the ſame Orders, with that of the Triangle, as one may ſee in the firſt figure.

Of the Octogone, or Eight-Angles, in Perſpective.

THE Octogone is a figure with eight angles, and eight faces, as the ſecond figure ſheweth it, in the Treaty of planes, fol. 25. and 26. One may ſee how it ought to be ſet in Perſpective in two different Manners. The elevation is as in the fore-going.



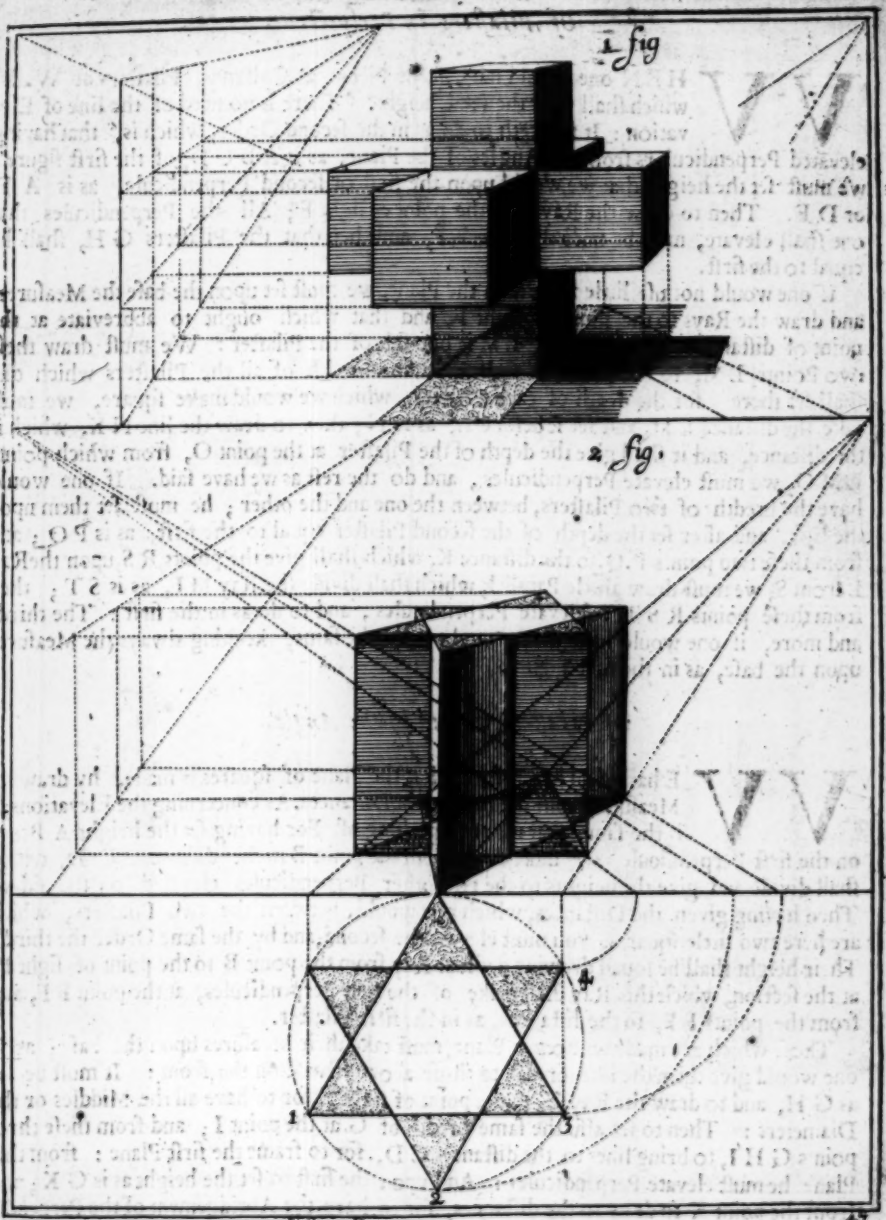


A double Croſs in Perſpective.

I have ſet this figure, and that below it, which the Sieur *Marolois* hath in his Works, according to the firſt Order that we follow. The which would be more difficult to ſet into Perſpective by another manner of the diverſity of the Angles. And by this Method it is very eaſy, Elevating it from all the angles of the Plane &c. as we have ſaid of the Polygones, and may be ſeen cleerly in the firſt figure.

A Stone-fluted, or ſtraked like a ſtarr, in Perſpective.

HAving not ſet the Plane of this figure with the other figure; I thought it fit to ſet it under its figure, for to abbreviate it in the Ordinary way, as we have ſet the others. The Geometrical Plane is eaſy to make. This is a Circle divided into ſix, whereof the diviſions ought to be joyned with right lines, leaving a Point between two; As for example, from 1, to 3. leaving 2. Then to take 2 and 4, leaving 3. and ſo others; the reſt is ſeen ſufficiently in the ſecond figure.


1 fig
2 fig.
1
2
3
4
47

Of Pilasters in Perspective.

WHEN one would make some Pieces, as Columns, Pilasters or Walls, which shall have the same height. There is no need of the line of Elevation: It sufficeth to do as in the second Order, which is, that having elevated Perpendiculars from the Angles of the Plane, as is A B C D, of the first figure; we must set the height that we would upon the first or second Perpendicule, as is A F, or D E. Then to draw the Ray E to the point of sight F; All the Perpendicules that one shall elevate, must be unto this line E F, and then that the Pilasters G H, shall be equal to the first.

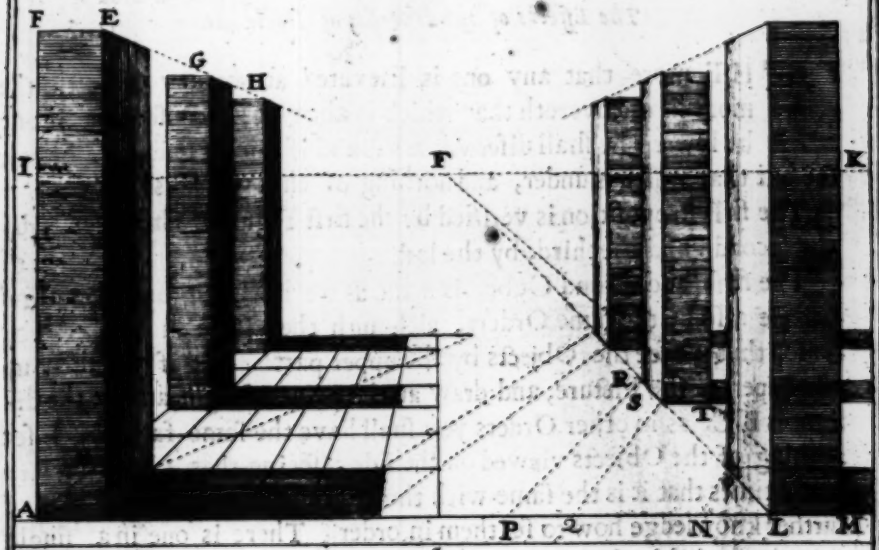
If one would not use little squares in the Plane, we must set upon the base the Measures, and draw the Rays to the point of sight F, and that which ought to abbreviate at the point of distance K; for example, L M is one side of the Pilaster: We must draw these two Points L M, to the points of sight F for the bredth of all the Pilasters which one shall set there; for the depth of each Pilaster, which we would make square, we must take the distance L M, and set it before L, as is N; then to draw the line N K, which is the distance, and it shall give the depth of the Pilaster at the point O, from which points L M O, we must elevate Perpendicules, and do the rest as we have said. If one would have the bredth of two Pilasters, between the one and the other; he must set them upon the base, and after set the depth of the second Pilaster equal to the first, as is P Q, and from these two points P Q, to the distance K, which shall give the points R S, upon the Ray L from S; we must draw a little Parallel, which shall divide the Ray M F, as is S T; then from these points R S T, to elevate Perpendicules, and to do as in the first: The third, and more, if one would have them, ought to do the same, keeping always the Measures upon the base, as in the first Figure.

Of Pilasters viewed by the Angle.

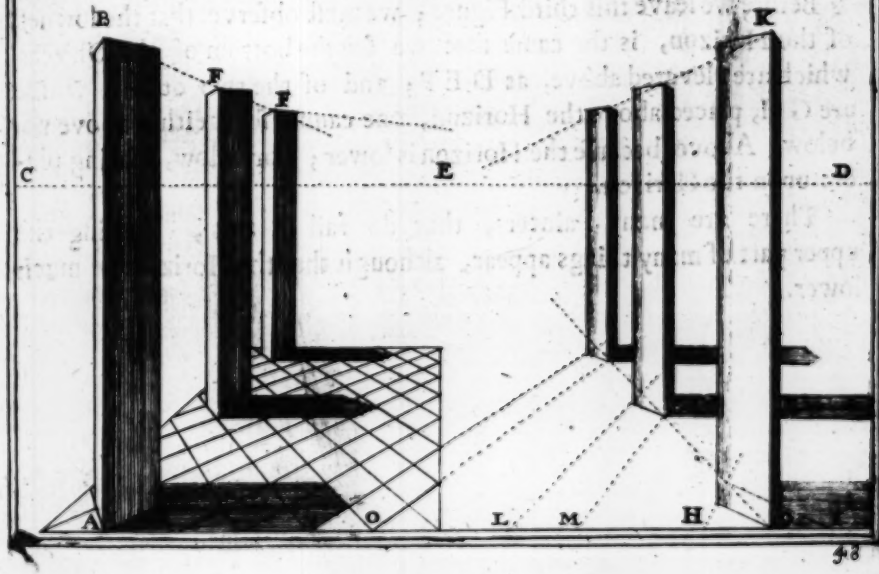
WE have said heretofore, that the Plane of squares is made, by drawing Measures from the base to the Distances. As concerning the Elevations, it is the same that we are speaking of. For having set the height A B, upon the first Perpendicule, we must draw from the point B to the distances C D, which shall divide and give the heights to the two other Perpendicules elevated on the sides: Then having given the Distances, which one would, between the two Pilasters, which are here two little squares, you must elevate the second, and by the same Order the third: Their height shall be found drawing a visual Ray from the point B to the point of sight E, at the section, which this Ray shall make of the first Perpendicules, at the point F F, and from the points F F, to the distances, as in the first Pilaster.

Those which are made without a Plane, must take their Measures upon the base; as if one would give them the like bredth to those above viewed on the front: It must be set as G H, and to draw the Ray G, to the point of sight E, for to have all the Middles or the Diameters: Then to set also the same bredth of G at the point I; and from these three points G H I, to bring lines to the distances C D, for to frame the first Plane: from this Plane he must elevate Perpendicules: And upon the first to set the height as is G K; and from the point K to draw to the distances, for to have the Abridgement of the Perpendicules of the sides, for the second Pilaster. The same shall be done from the Points L. M. And the third, from the points N O. The rest is easy enough to doe, viewing the second figure.

1 fig



2 fig



48

The Effects of the diverſity of Horizons.

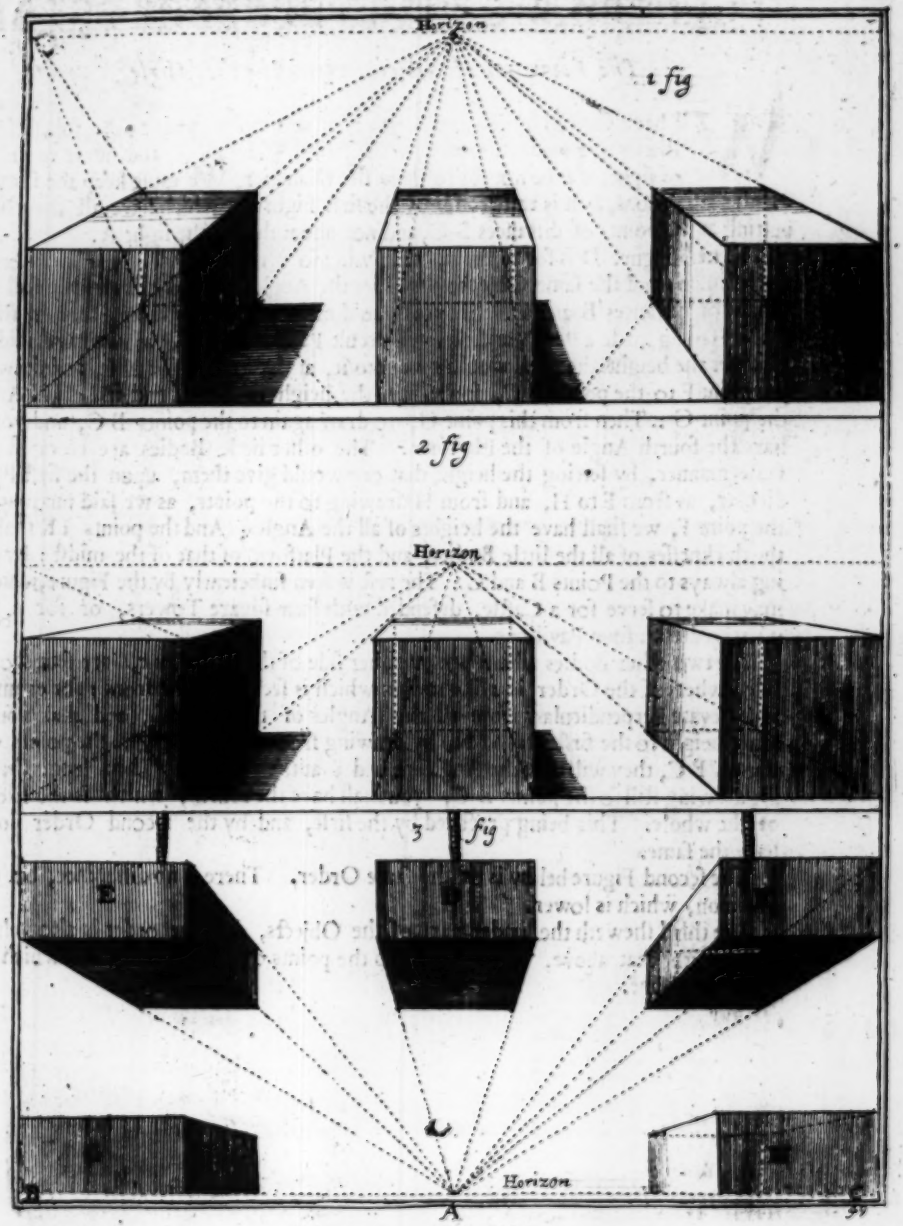
THE more that any one is Elevated above any Object, the more he diſcovereth that which is above. By conſequent, if one be lower, he ſhall diſcover leſs; and if one be under it, he can ſee but that which is under, and nothing of that which is above.

The firſt Propoſition is verified by the firſt Figure: The ſecond, by the ſecond: and the third, by the laſt.

The firſt and ſecond Cube, is made as we have taught; the third is made alſo by the ſame Orders, although they ſeem more hard, by reaſon that we ſee the Objects by the upper part. But if you turn up the Paper, or the Picture, and draw at the point of ſight, and at the diſtances B C, as in other Orders you ſhall have the ſame facility. I ſet nothing of the Objects viewed on the ſide: ſeeing that I have ſaid ſo many times that it is the ſame with thoſe on the front: And for to give further knowledge how to ſet them in order; There is one in a ſingle ught, and the other ſhadowed alſo.

Before we leave this third Figure; we muſt obſerve, that the lowneſs of the Horizon, is the cauſe that we ſee the bottom of the Objects, which are elevated above, as D E F; and of the two others, which are G H, placed above the Horizon, one cannot ſee neither above nor below. Above, becauſe the Horizon is lower; nor below, it being placed upon the Horizon.

There are many Painters, that do fail in this; making the upper part of many things appear, although that the Horizon be much lower.


Horizon
1 fig
2 fig
Horizon
3 fig
E
Horizon
A

The Elevation of Objects viewed by the Angle.

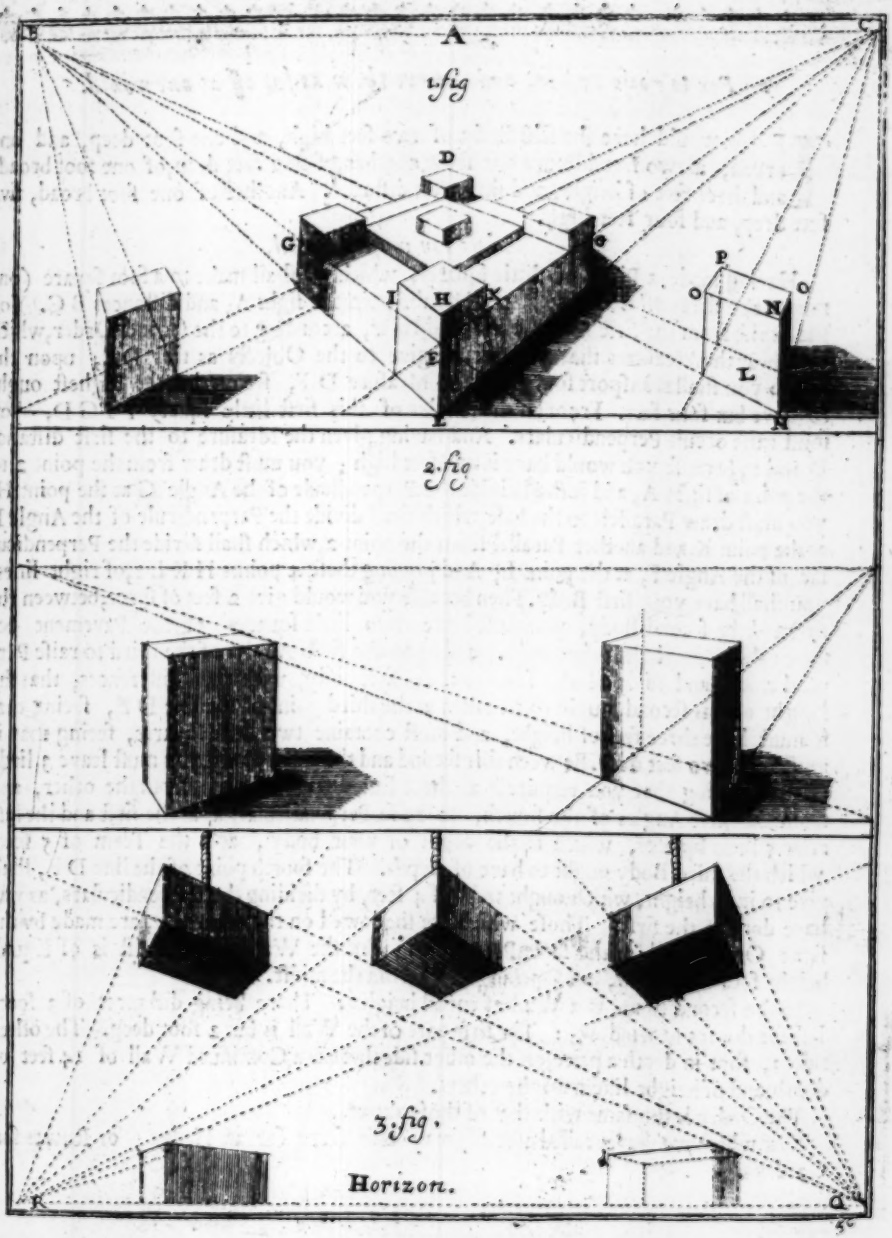
WE have ſhewed by the two Figures of the 19 h. and 20th. fol. how the Planes are made, drawing to the points of diſtances, and never to the point of ſight, if it be not for to finde the Diameter, We muſt keep the ſame rule for the Elevations, as it is eaſie to ſee by the firſt Figures; which have all their lines abutting at the points of diſtances B C, and not one at that of the ſight A.

The firſt Figure D is for to ſhew, that whenſoever there ſhall be an infiniteneſs of Parts, in one and the ſame Object viewed by the Angle, we muſt draw them all to the points of diſtances B and C. If you would make one of the ſame, ſee here the Order: Having made a Plane, and elevated occult Perpendiculars, as we have ſaid, you muſt ſet the height that you would give unto it, at the firſt Angle E F, and draw from the point F to the points B C, for to have the height of the ſecond and third Angle at the point G: Then from this point G, to draw again to the points B C, and you ſhall have the fourth Angle of the Platform. The other little Bodies are elevated in the ſame manner, by ſetting the height that one would give them, upon the firſt Perpendicular, as from F to H, and from H drawing to the points, as we ſaid but now from the point F, we ſhall have the heights of all the Angles; And the points I K ſhall give the thickneſſes of all the little Bodies, and the Platform of that of the midſt: by drawing always to the Points B and C: The reſt is ſeen ſufficiently by the Figure, which one may make to ſerve for a Caſtle, defended with four ſquare Towers, or for a Palace quartered with four Pavilions.

The two other Bodies which are on either ſide of the great one, are ſeen from the ſide, whereof the Order is alike to that which is ſeen from the front: for example, if you elevate Perpendiculars from all the Angles of the Plane L, and that you give your height to the firſt, as M N, by drawing from the point N, to the points of Diſtances B C, they will give the Angles 2 and 3 at the point O. Then from the point O, drawing ſtill to the points B C, you ſhall have the fourth, which is the Elevation of the whole. This being practiſed by the firſt, and by the ſecond Order you ſhall have the ſame.

The ſecond Figure below is of the ſame Order. There is no difference, but of the Horizon, which is lower.

The third ſheweth the under-part of the Objects, but the order is altogether the ſame with that above, drawing all to the points of diſtances Q R, which is the Horizontal line.


A
1. fig
D
G
C
I
H
K
E
F
P
O
O
N
L
N
2. fig
3. fig.
Horizon.
K
Q

For to raiſe Bodies, and remove them as far off as one would.

IF you would have the firſt Body of two feet high, and one foot deep, and one broad, at two feet diſtance one from another, of two feet deep, of one foot broad, and three feet of height, and three feet diſtance. Another of one foot broad, five feet deep, and four feet high.

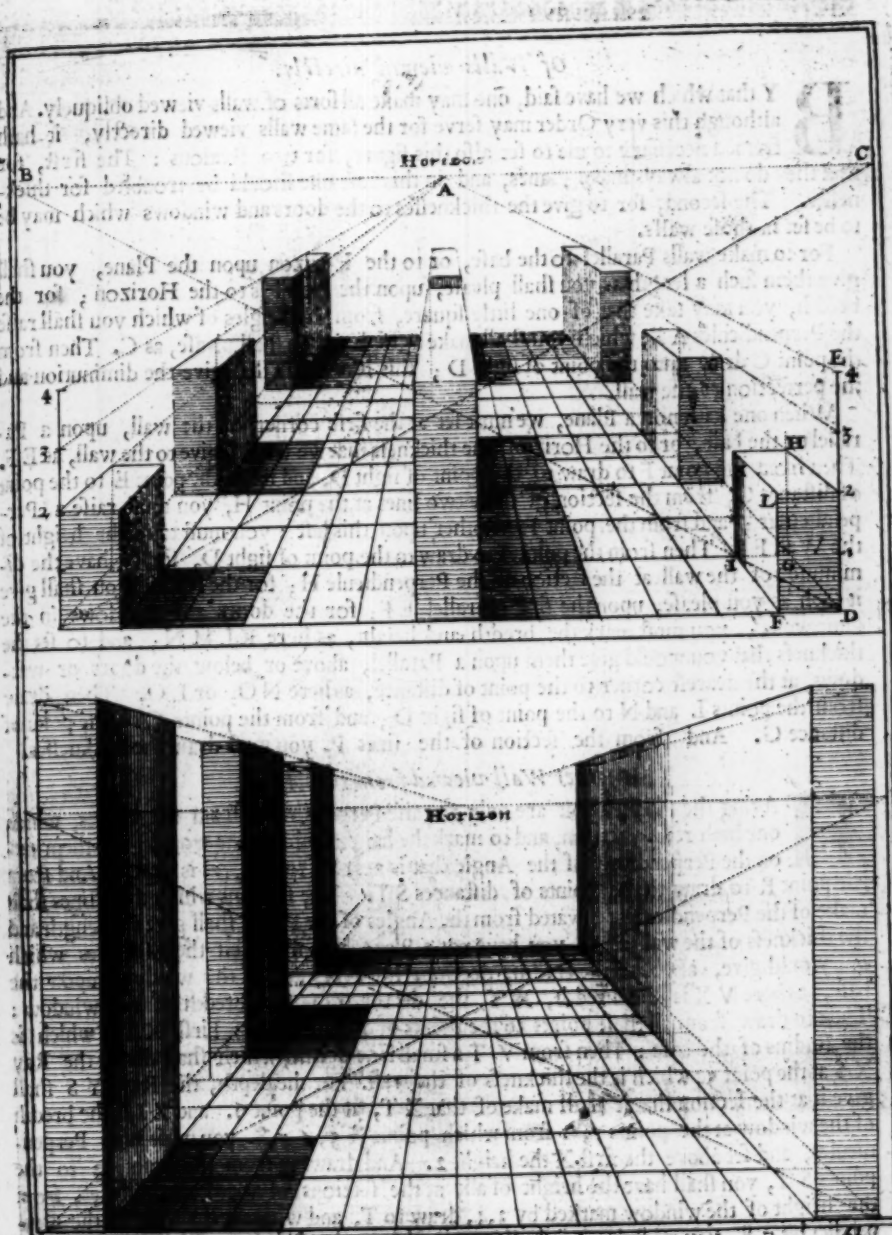
Thus you muſt proceed.

Having made a Plane of little ſquares, which we ſhall make to a foot ſquare (one may make them of what ſize he will) by the points of ſight A; and diſtances B C. You ſhall raiſe from the firſt Angle a Perpendicular, according to the ſecond Order, which ſhall bear the Meaſures that you would give to the Objects as this D E, upon the which you ſhall tranſport four times the Meaſure D F, ſeeing that the higheſt ought to have but four feet. From all the Angles of this firſt little ſquare F I G D, you muſt raiſe occult Perpendiculars. And having given the Meaſure to the firſt diſtance D and 2, becauſe you would have it two feet high; you muſt draw from the point 2 to the point of ſight A, and it ſhall divide the Perpendicule of the Angle G at the point H, you muſt draw Parallels to the baſe, which ſhall divide the Perpendicule of the Angle I, at the point K, and another Parallel from the point 2, which ſhall divide the Perpendicular of the Angle F, at the point L; And joyning theſe 4 points H K L 2, of right lines, you ſhall have your firſt Body. Then becauſe you would give 2 feet of ſpace, between the firſt and the ſecond Body, you muſt leave two little ſquares of the Pavement between the one and the other body. and upon the firſt Angles of the third to raiſe Perpendicules, and to do all the ſame as at the firſt body, with theſe differences; that the height of this ſecond, ought to be taken at the third point of the line D E, ſeeing that it muſt have three feet of height, and muſt containe two little ſquares, ſeeing that it muſt be of two feet deep. Between this ſecond and the third Body, you muſt leave 3 little ſquares, ſeeing that you require it at three feet diſtance the one from the other, and from the firſt Angles of the fourth, to raiſe Perpendiculars as at the firſt and the laſt after 5 little ſquares, which is the depth of your body, and the Term of 5 feet, which the third Body ought to have of depth. The fourth point of the line D E, ſhall give to it, its height, which ought to be of 4 feet, by dividing the Perpendiculars, as you have done in the firſt. Thoſe which are ſhadowed on the other ſide, are made by the ſame Order, and of the ſame Proportion; But the Wall of the midſt is of Equall height four feet only, an Opening of 3 feet in the midſt.

In the ſecond figure is a Wall of equall heights. There being diſtances of 3 foot, left for doores or windows: The firſt part of the Wall is but 2 foot deep. The other two 3, foot in depth a peice, on the other ſide there is a Continued Wall of 14 feet of depth, and of height like nnto the others.

The Order is the ſame with that of thoſe above.

That which we have called a Wall, may alſo ſerve for an Hedge; or Rowes for Gardens.


Horizon
B
A
C
D
E
F
G
H
I
L
1
2
3
4
Horizon

Of Walls viewed directly.

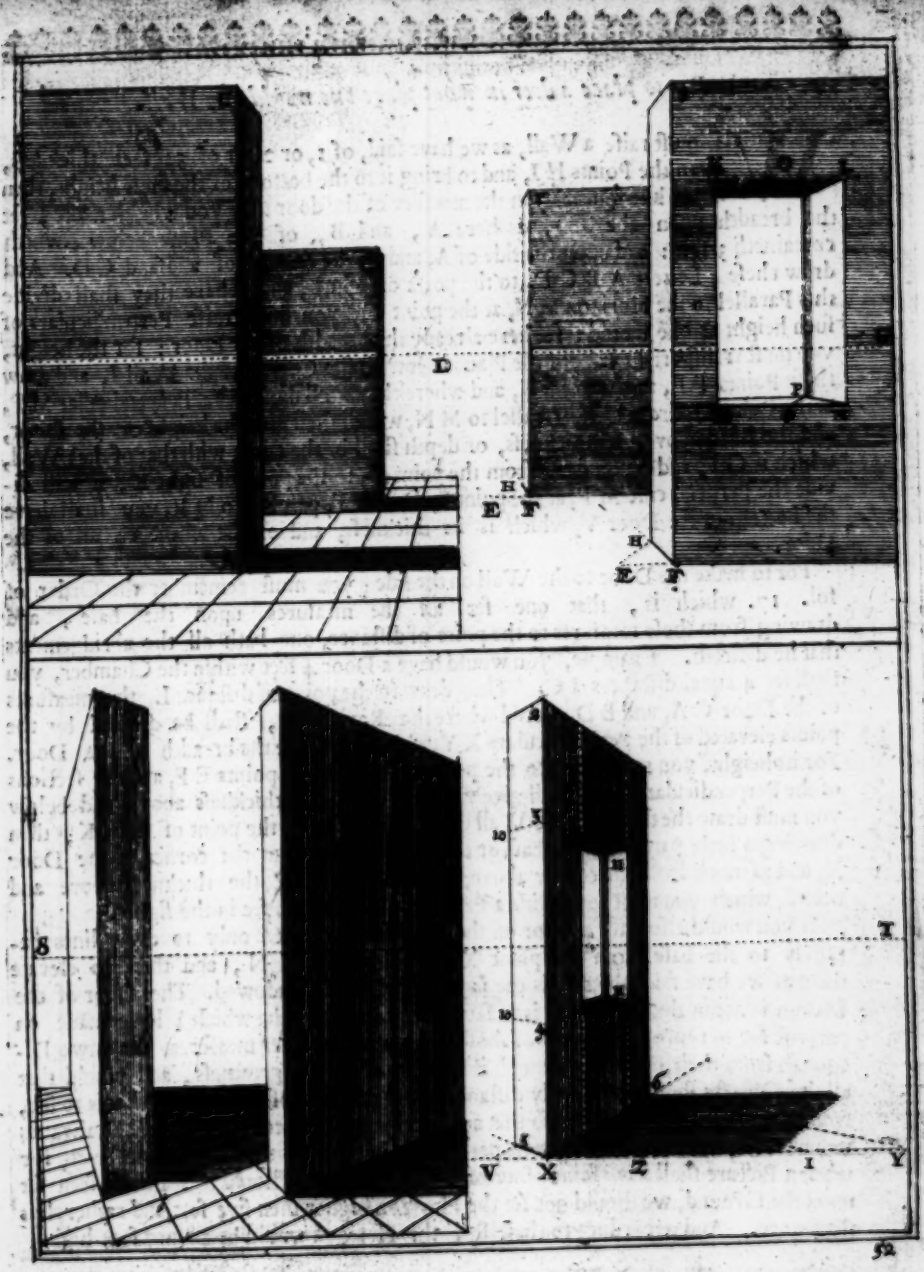
BY that which we have ſaid, one may make all ſorts of walls viewed obliquely. And although this very Order may ſerve for the ſame walls viewed directly, it hath ſeemed neceſſary to me to ſet alſo this figure, for two Reaſons: The firſt, for that they do not always make Planes, and in this caſe one ſhould be troubled for thicknesſes. The ſecond, for to give the thickneſſes to the doors and windows which may be to be ſet in thoſe walls.

For to make walls Parallel to the baſe, or to the Horizon upon the Plane, you ſhall give them ſuch a length as you ſhall pleaſe, upon the Parallels to the Horizon; for the bredth, you may take that of one little ſquare, from the Angles of which you ſhall raiſe the Perpendicules A B, which you ſhall make as high as you ſhall pleaſe, as C. Then from the point C draw unto the point of ſight D; this Ray C D ſhall give the diminution and the perfection to the wall.

When one hath not a Plane, we muſt ſet at the firſt corner of the wall, upon a Parallel to the baſe, or to the Horizon, the thickneſs that we would give to the wall, as E F. Then from the point F to draw to the point of ſight D, and from the point E to the point of diſtance G, from the ſection of theſe two lines at the point H, you muſt raiſe a Perpendicular; and from the point F, another upon this laſt: you muſt take the height of the Wall F I. Then from the point I to draw to the point of ſight D, for to have the diminution of the wall at the ſection of the Perpendicule H; for the length, you ſhall give it ſuch as you pleaſe, upon the firſt Parallel E F; for the doors and windows in the ſame walls; you muſt mark the bredth and height, as here K L M N; and to ſet the thickneſs that you would give them upon a Parallel, above or below the doors or windows, at the neareſt corner to the point of diſtance, as here N O, or L O. Then draw from the points L and N to the point of ſight D; and from the points O to the point of diſtance G. And from the ſection of the lines P, you muſt draw the thickneſſes.

Another Wall viewed from the Angle.

HAving the Plane, you are only to raiſe Perpendicules from the Angles, which one hath reſolved upon, and to mark the height, which one would give them upon the Perpendicule of the Angle that is neareſt to you, as is Q R. And from the point R to draw to the points of diſtances S T. The ſections which theſe lines ſhall make of the Perpendicules, elevated from the Angles of the Plane, ſhall give the length and the thickneſs of the wall: If you have not a Plane, you muſt ſett the Meaſures which one would give, aſwell to the bredth, depth of the doors and of the windows upon the baſe, as here V X is the bredth, X Y the depth, Z I the bredth of one window: Then to draw from all theſe points to the points of diſtances S T: Firſt X T, which is the Radius of the baſe: Then from V T a ſmall line occult, which ſhall divide the Ray X S at the point 5, which is the thickneſs of the wall. For the depth, the Ray Y S ſhall give it at the ſection that it ſhall make of that X T, at the point 6. and Z I, the bredth of the window at the points 7,8. from which points X 5, 6,7,8. you muſt raiſe Perpendicules, and ſet above the firſt X the height 2. And drawing from the point 2 to the points S T, you ſhall have the height of all, at the ſections of the Perpendicules, from the height of the window marked by 3,4, draw to T, and where it ſhall divide the Perpendicules 7,8, you muſt draw right lines: And from the Corners 9 to S, for the depth 10, at the point T, and from the ſection 11. to draw a line Perpendicular. All this may ſerve for a Palliſadoe as for a wall.

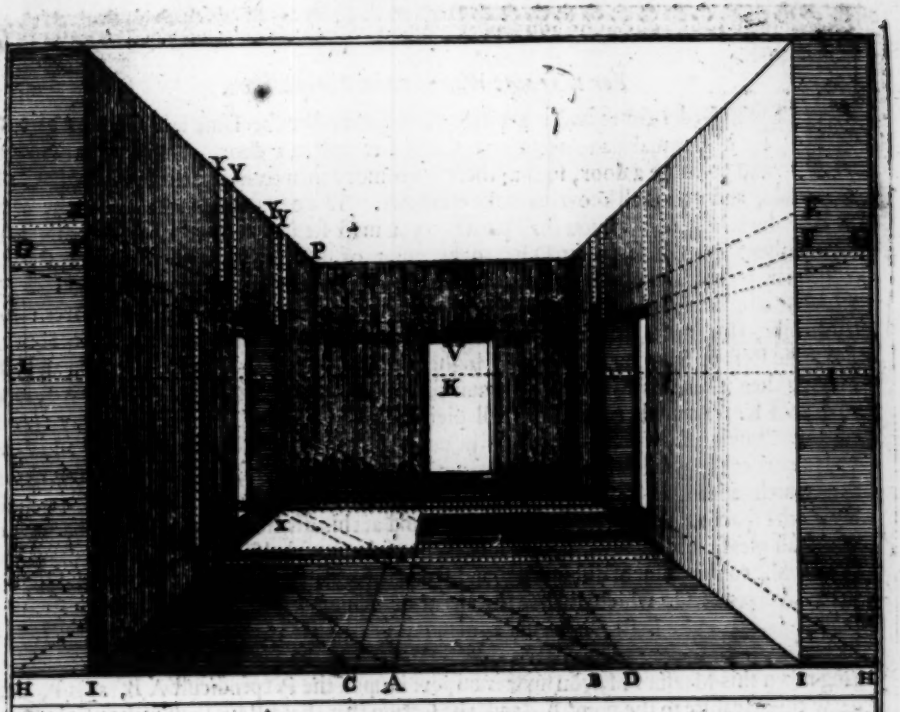

D
H
E F
H
E F
S
T
V X Z I Y
52

For to place a doer in what place one would of a Wall.

WE muſt raiſe a Wall, as we have ſaid, of 1, or 2, or of 3, feet thickneſs, upon the Points H I, and to bring it to the bottom of the ſame height, then if you know near upon the meaſure of the door that you would make; ſet the breadth upon the baſe, as here A, and B, of the Plane below, which containeth 3 feet: and upon the ſide of A, and B, the breadth of a Band C D. And draw theſe 4 Letters A B C D, to the point of ſight K, and where they ſhall divide this Parallel to the Horizon M N, at the point O, you muſt raiſe Perpendiculars of ſuch height as one would: ſee here already the breadth of the Door: for the height, you muſt tranſport D F E, of the Plane below to the Corner of the Wall I, and draw theſe Points F E, to the Point K, and where they ſhall divide the Perpendicular M P, at the Point Q, draw Q R, Parallel to M N, which ſhall give the height of the Door, and the Band above. Its thickneſs, or depth ſhall be the ſame, with that of the Wall, which is G F, and if you draw from the point G, to the point of ſight K, it will divide the Perpendicule M P, at the point S, draw S T, parallel to Q R, you ſhall have the bottom of the Door V, which is its thickneſs, and of the whole circuit of the Door.

For to make the Door to the Wall on the ſide; you muſt remember the Order of fol. 17. which is, that one ſet all the meaſures upon the baſe, and drawing from theſe meaſures to the point of diſtance, one hath all the abridgements that he deſireth. Example, you would have a Door 4 feet within the Chamber, you ſhall ſet 4 equal diſtances I C. Then draw to the point of diſtance L, the meaſures of the Door C A, and B D. And where the Ray I M, ſhall be divided by the points elevated of the Perpendiculars X Y, which ſhall give the breadth of the Door. For its height, you muſt draw to the point of ſight K, the points E F, and the ſections of the Perpendiculars X Y, ſhall give you it! For the thickneſs above and below you muſt draw the thickneſs the Wall G H, and F I to the point of ſight K; then drawing a little parallel to the baſe or to the Horizon, from the corner of the Door X, and as much from the corner above, you ſhall have X Z, the thickneſs above and below, which you muſt joyn with a Perpendicular, as you ſee in the figure.

If you would alſo have a Door on the other ſide, you have only to draw lines parallels to the baſe from the point X, to the Ray I N, and then to elevate them as we have ſaid, the reſt is the ſame with the ſide ſhadowed. The Door of the bottom is not in the midſt, that is to ſay, a foot and half; the which I have made on purpoſe for to reprove the error of thoſe, who without other meaſures, draw two Diagonals from their Picture, although it be of an enormous greatneſs, and would that all the Objects ſhould be equally diſtant from the ſection of theſe lines: that is to ſay, from the midſt of the Picture, ſo that according to their account, it ſhould be alwayes mounted for to ſee their work in its perfection, in which they deceive themſelves; for when a Picture ſhall have fourty foot of height, and that it ſhould be for to be ſeen ſet upon the Ground, we ſhould not ſet the Horizon higher then five feet, and rather leſs then more. And according to their Rule this Horizon would be twenty foot high.


Y
Y
Y
P
V
K
H
I
C
A
B
D
I
H

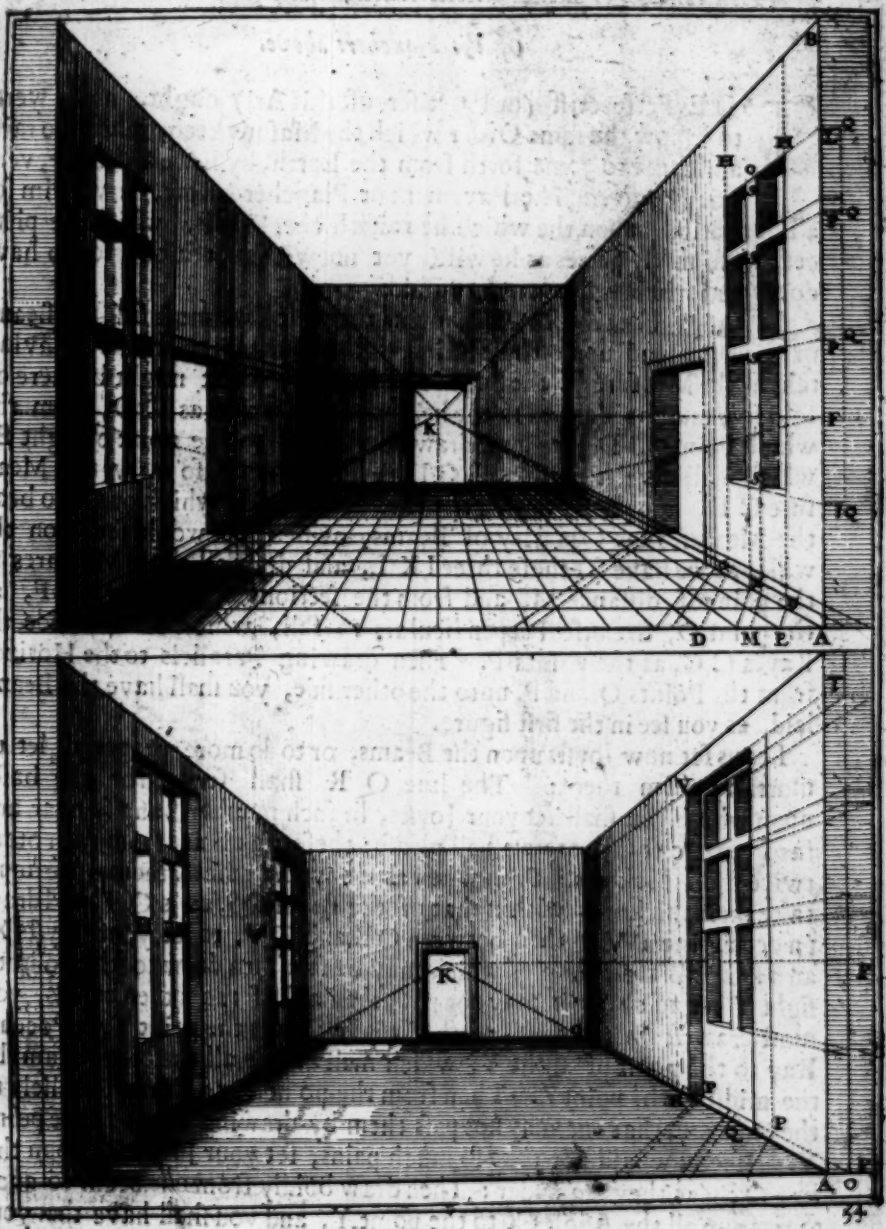
E
F
C
A
B
D

For to frame Windows in Perſpective.

THE Order for to make a window, is altogether the ſame with that of a door, for if you make an Aſcent or a Croſs-bar within a door, it will be a window and no more a door, ſo that there is no more then to learn to make a ſingle Croſs or double, and you ſhall know to make windows. If you would make one in the wall A B of ſuch largeneſs as you ſhall pleaſe; you muſt ſet its meaſure upon the baſe, as D E, and draw from theſe points D E, to the point of diſtance F, and from the ſection which the points G ſhall make at the Ray A C, you muſt raiſe the Perpendicules G H, which ſhall give the bredth of the window, which is here but of two little ſquares: for the height, they make them ordinarily the neareſt that they can to the Plancher above; But, the Reſt or Stay ought not to be higher then of three feet, or three feet and an half. Having then taken this Meaſure, you muſt ſet it upon the Perpendicular A B, as A I, and to draw I K. And where this line ſhall divide G H, that ſhall be the reſt, a ſtay: And likewiſe drawing L, which is above to the point of ſight K, the ſection of G H ſhall be the upper part of the window, the which will give us a long ſquare, or Parallelogramma, to the which adding a Croſs, it will be a window; for to make this Croſs-bar, you muſt divide the ſpace D E into two equal parts. And at this diviſion to give ſuch a bredth as you ſhall pleaſe, ordinarily it is four inches, or at the moſt halfe a foot. And to draw this bredth M, to the point of diſtance F, and from the ſection of the Ray A C, to elevate the Perpendicules N O, which ſhallbe the aſcent or Riſing of the midſt of the window for the Croſs-bars, you ſhall ſet therein as many as you pleaſe; there is nothing but to obſerve this, that they ought to have as much thickneſs as the riſing pillar; wherefore having taken this Meaſure M, you muſt tranſport it upon the Perpendicule A B, as is P, and draw this Meaſure to the point K, and the ſection that theſe Rays ſhall make of the Perpendiculars G H, G H, ſhall be the Croſs-bars; and by conſequent the window made, for its thickneſs, it is not here but of the half of the wall; for to give it to this window, you muſt draw lines occult from the point Q to the point K, and drawing little Parallels to the baſe, from the corners of the window S, they ſhall give the thickneſs at the point, that they ſhall divide the line Q X, as we have ſaid of the door.

This window is equal with the wall within ſide which is not ordinary, becauſe there are that make them with Chamfrettings or Scunches, that is to ſay, that they enter within the wall, ſometimes a foot more or leſs.

The Order thereof is altogether the ſame, except that in ſtead of taking the ſections upon the Ray A C K; we muſt take it at that which entreth within the wall, as far as one would cauſe the windows to enter, as may be ſeen in the figure under the Ray O K, which receiveth the Meaſures which one hath ſet upon the baſe; and that he muſt draw at the point of the diſtance F all the reſt, as at thoſe above, taking the thickneſſes of the window, between the Perpendicule O unto that F, which is the laſt. Then when the window ſhall be all finiſhed upon the Ray O K, and of the bredth of the wall O F, we muſt raiſe the Perpendicule A, and draw it to the point K. Then from the corner below the window to the points P, to make a little Parallel, which divideth the Ray A K at the point Q, which ſhall be the thickneſs of the wall, which ſhall cover a little of the window, and ſhall make the thickneſs R P to be ſeen from the point R, you muſt elevate the Perpendicule R V, which ſhall divide the Ray T K at the point V, which ſhall be the thickneſs above the window. Of the Meaſures of that, one ſhall make as much as they will, keeping therein a ways the ſame Order.



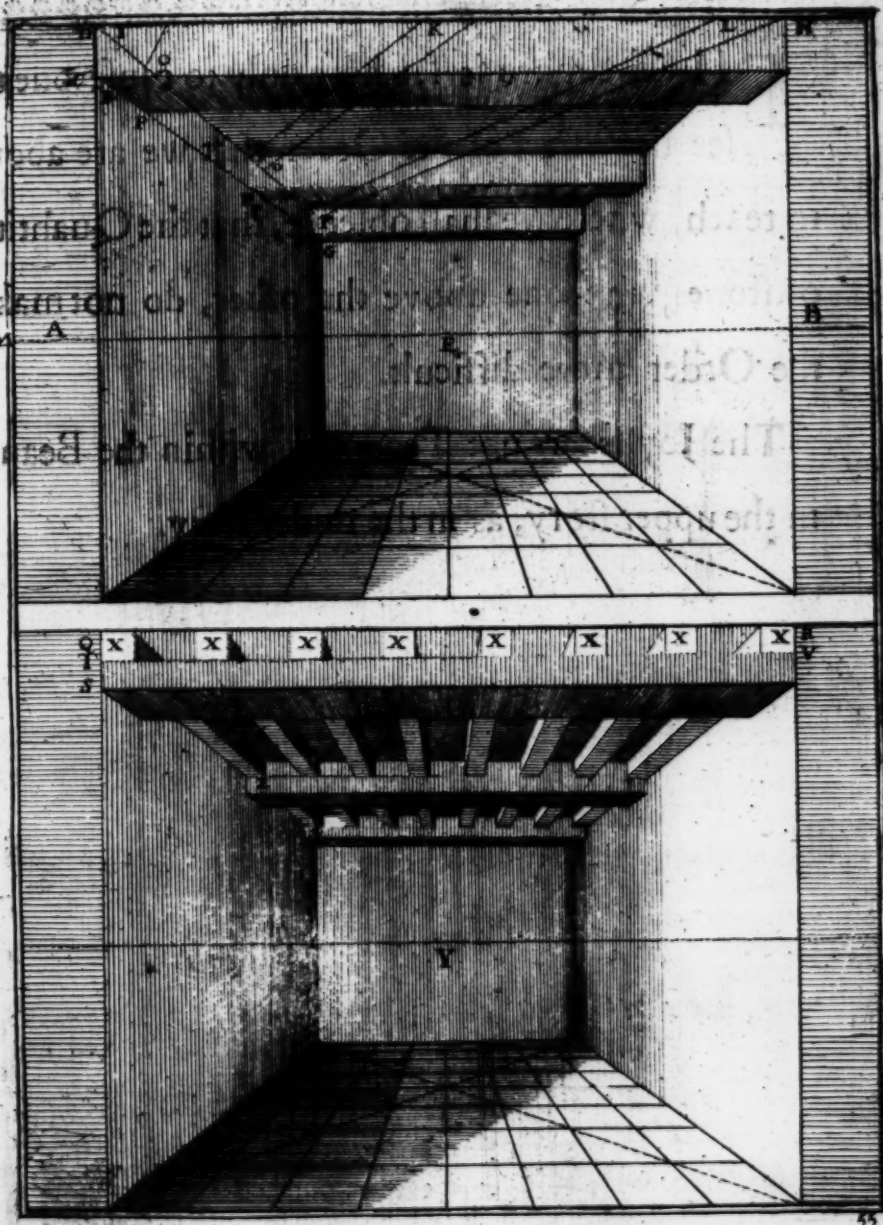
P.

of the Planchers above.

THE Perſpectiff (or Practiſer of this Art) ought, as it were, to follow the ſame Order which the Maſons keep, which do raiſe and cauſe to come forth from the Earth, by little and little, very fair Houſes. The Pavement or Plancher below, ſerve him for a Foundation, upon the which he raiſeth the Walls, which he pierceth in ſo many places as he will(yet not without reaſon) for to have doors and windows, as we have ſaid.

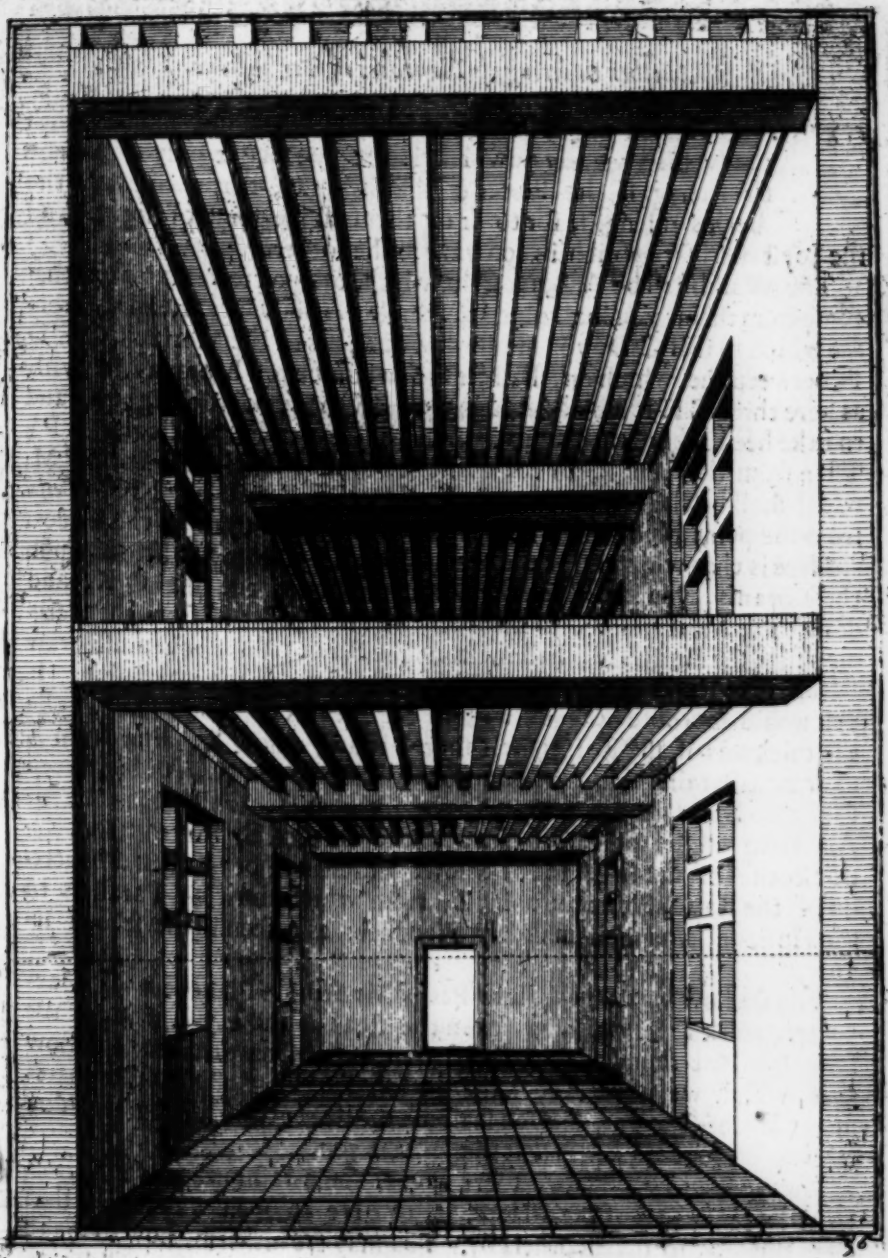
Let the walls raiſed be A B, upon the which we muſt firſt ſet Beams or Girders, and upon theſe Girders the Quarters or Joyſts. Having taken the Meaſure of the Square of its Piece (as it might be here on foot) it muſt be carried to the height of the wall, as C D, from the which Points C D, we muſt draw occult lines to the point of ſight E, which ſhall give the Rays C G D F. You muſt alſo carry this Meaſure C D, upon the Parallel to the Horizon D H, which ought to bear the Meaſures and Quantity of Beams, which you would ſet upon the wall, as we have ſet theſe three I K L, and draw all thoſe Meaſures to the point of diſtance M, and from the ſections of the Ray D F, at the point O, to cauſe Perpendiculars to fall, which ſhall divide the Rayes C G, at the points P. Then drawing Parallels to the Horizon from the Points O and P, unto the other ſide, you ſhall have the Beams laid, as you ſee in the firſt figure.

Let us ſet now Joyſts upon the Beams, or to do more properly, let us mortaiſe them there: The line Q R ſhall ſerve for the baſe, upon which you ſhall ſet your Joyſts, in ſuch number, and ſo near and far from each other as you ſhall pleaſe: theſe are diſtant from each other twice their thickneſs. Then when as we would embox them, we muſt take their thickneſs within that of the Beam Q S, as is Q T, and draw an occult line T V; then between Q R and T V, to ſet your Joyſts X, and from all their Angles which may be ſeen, to draw to the point of ſight Y; and that you may not paſs the half of the other beams, you muſt draw from the midſt of the firſt, which is the point T, an occult Ray to the point of ſight Y, which ſhall divide all the other beams by the midſt at the point Z. Then from the point Z to draw Parallels to the Horizon, that one may not paſs them by drawing Joyſts to the point Y. If you would not take ſo much pains, ſet your Joyſts Z, upon the line Q R, as they are under: Then draw boldly from one beam to another, from all the Angles X to the point Y, and you ſhall have that you demand


A
B
X
Y
55

THIS Figure is ſet here only to cauſe one to ſee the effect of the Order that we are about to teach, where we ſhall obſerve, that the Quantity of ſtories, the one above the other, do not make the Order more difficult.

The Joyſts are not Tenanted within the Beams in the upper ſtory, as in the under ſtory.



Another Ordering of Planchers in Perſpective.

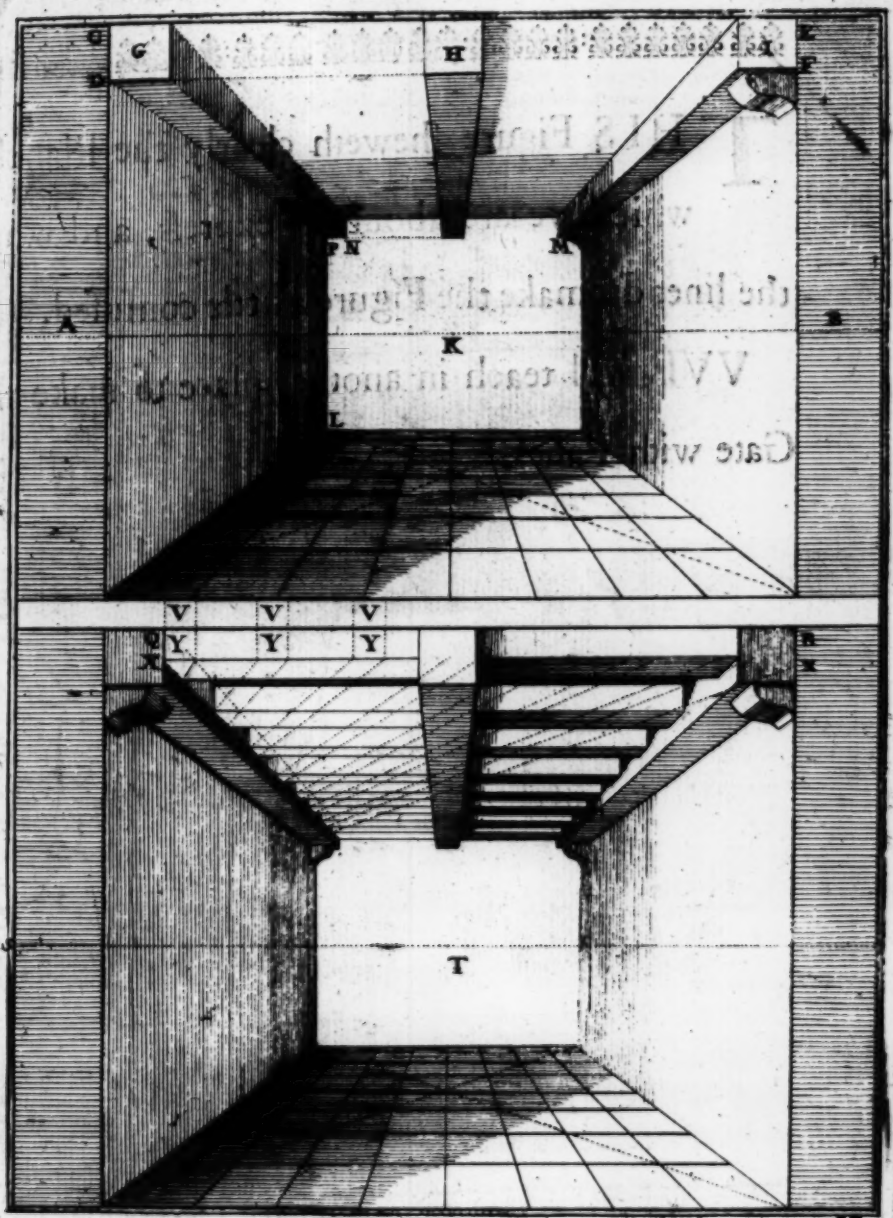
THIS faſhion ought to be ordered in the ſame manner with that which we are now leaving: We ought only to change the ſetting of the Pieces; that is to ſay, that we muſt ſet the beams at length, for to draw them to the point of ſight. and the Joyſt a croſs, which is contrary to the other.

The Walls ſhall be A B, upon the which, or upon the Cattozes that come from them, you ſhall place the thickneſs of the beam C D, from the which points C D, you muſt draw Parallels to the Horizon C E D F, between the which one ſhall ſet ſuch a number of beams as he will, as here three G H I, which he ought to draw to the point of ſight K, and to take heed where the Ray D P ſhall divide the Perpendicular L P; Then from the point P, to draw a little Parallel to the Horizon P M, which ſhall be the term ot bound of the other Rays, as P N. And from the point N to raiſe a Perpendicule N O, and ſo to all the Pieces.

Here is that which is for the beams, for to ſet the Joyſts acroſs upon theſe beams, you muſt ſet their thickneſs upon the line Q R, and draw theſe Meaſures V, to the point of diſtance S, and from the ſection which the Angles V, ſhall make at the Ray Q T; you muſt draw Parallels to the Horizon, unto above the beam of the other ſide. If you would mortaiſe them within the beams; you muſt take the thickneſs of the Rafters within the beam, as is Q X. And from X to draw a Parallel to the baſe, unto the other ſide X X. And between theſe two lines Q R and X X, to ſet the diviſions V, which ſhall be Y. And from all the points, to draw to the diſtance S, for to have the thickneſſes of the ſide, and of below, which ſhall be taken in the ſection of the Ray X T, at the point Z, from which drawing Parallels to the Horizon, you ſhall make the Plancher, as is ſeen in the ſecond figure.

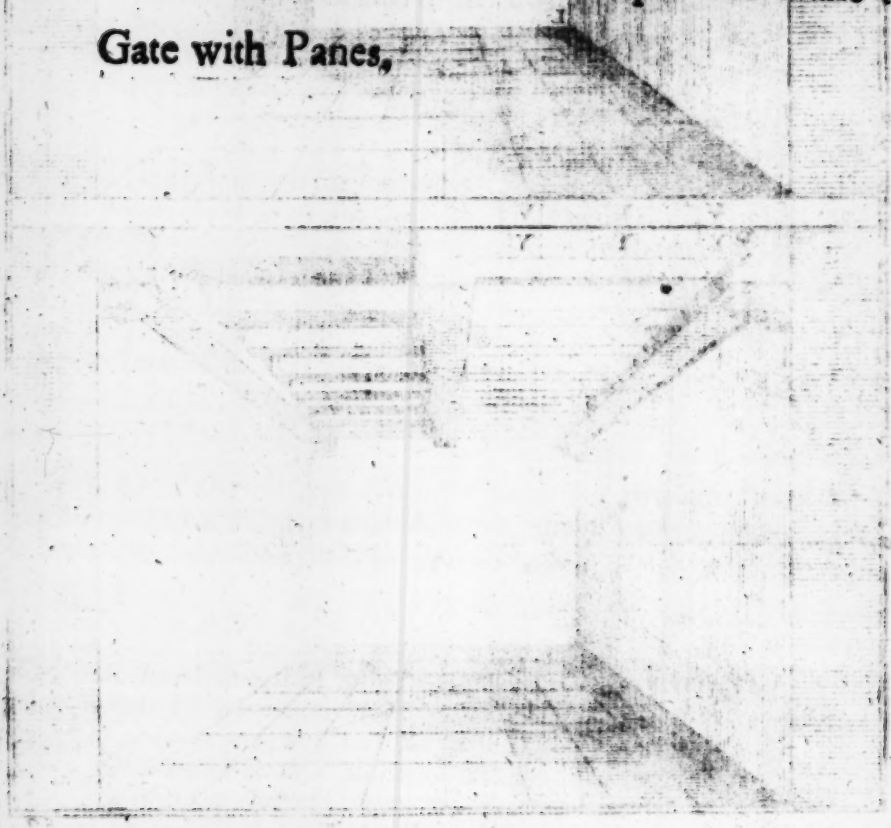
You ſee how you muſt ſet into Perſpective ſingle Planchers of Carpenters work; If yet after, or in the ſtead of thoſe you would have ſome fair Plat-found of Pictures, or ſome other Compartment; follow that which we have ſaid in the 35 fol. ſpeaking of the Compartments of the Gardens, and you ſhall uſe the line Q R for the baſe. You may make there whatſoever it ſhall pleaſe you.

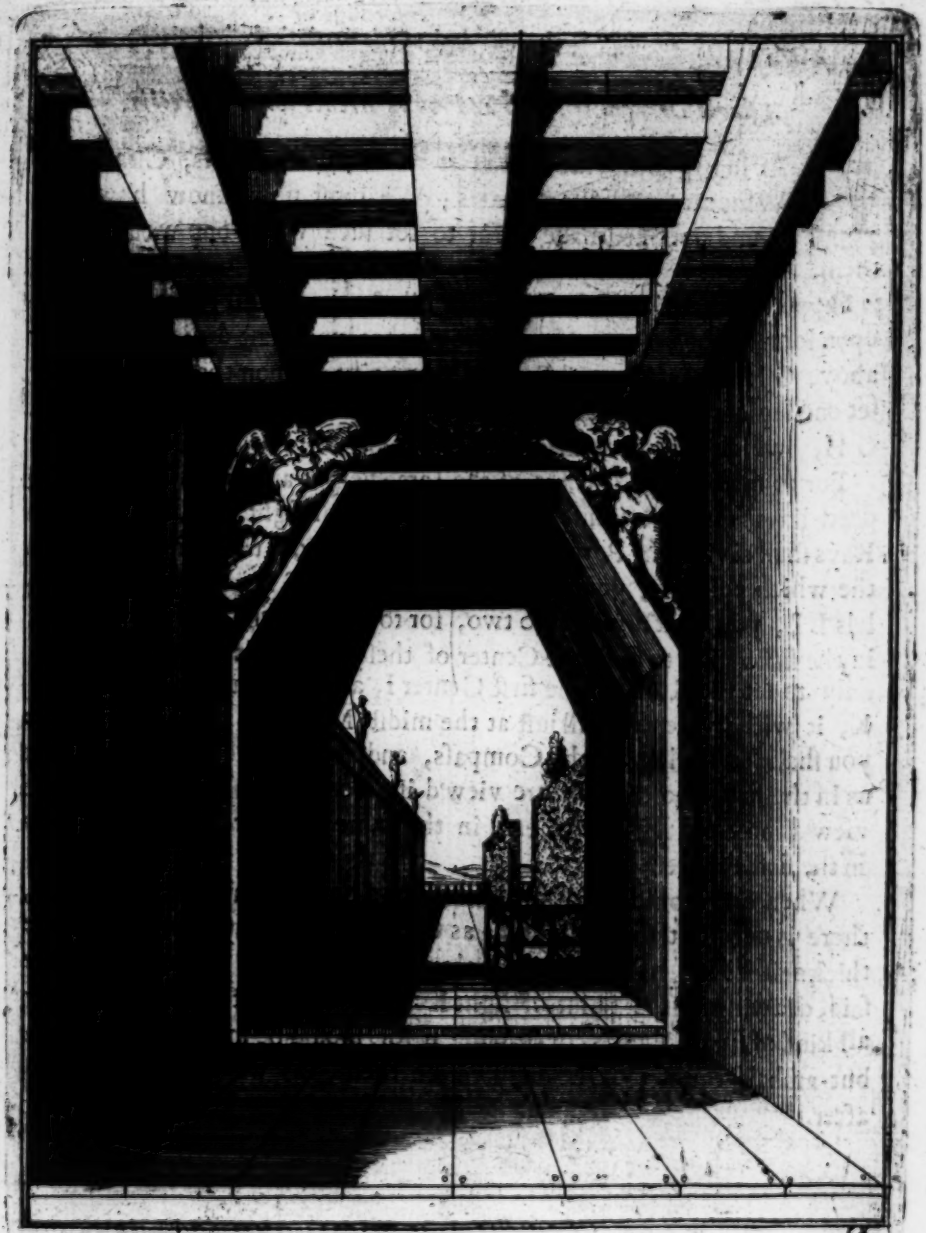
For the Planchers below, there are of ſome faſhions in the folios 30 31 32 33 and 34 of the Planes, for to give an open way to him that uſeth this Art to Invent others by. You may ſee hitherto, how to make any Halls or Chambers perfectly. We will teach the moveables at the end of this firſt part.


G
H
N
M
K
L
V
V
V
Y
Y
Y
T

THIS Figure ſheweth clearly the Plancher which we are about to expreſs, and where the lines do make the Figure a little confuſed.

WE will teach in another place to make this Gate with Panes,





A ſingle Draught of Doors and round Arches view'd directly.

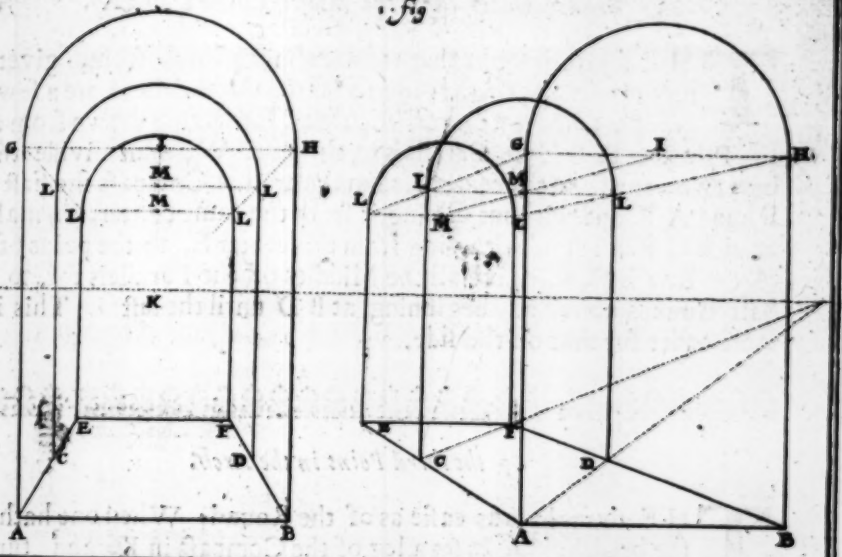
HAving ſpoken that which is neceſſary for Halls, Chambers, Windows and ſquare Gates; We muſt now know how the round ones are made; for to ſet ſuch where one would have them.

Suppoſing that A B C D E F were Pilaſters, or ſmall Pillars elevated upon ſome Plane; for to place there Arches, you muſt divide the bredth above G H, into two equal Parts, at the point I, upon the which having ſet one leg of the Compaſs, you ſhall make with the other a demi-round G H, which ſhall give the firſt Arch.

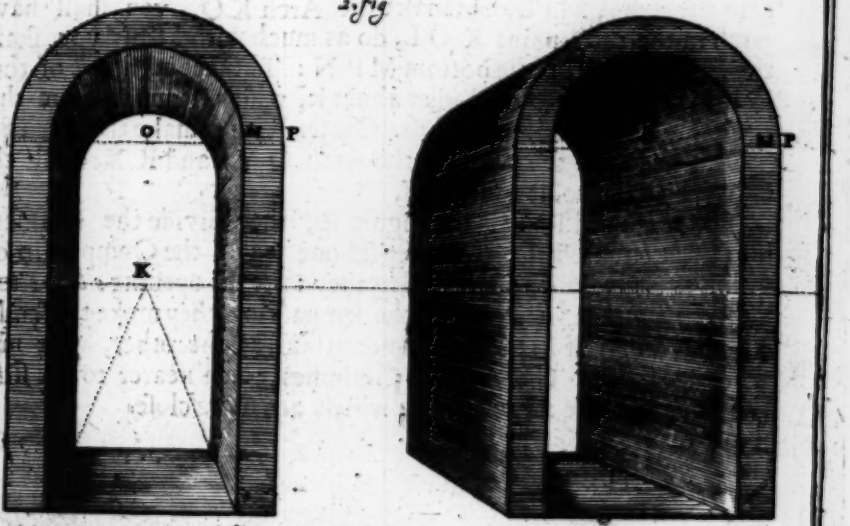
For to make all the others of the ſame height and bredth, you muſt draw lines from the points H G, to the point of ſight K, and theſe two Rays ſhall divide the Perpendicules C D E F, at the points L, from the which points L, you muſt draw Parallels to G H, the which Parallels L L, you muſt divide into two, for to make there demi-rounds, as in the firſt. For to finde the Center of theſe Parallels L, there is but only to ſet the Rule to the firſt Center I, and to draw it to the point K, it will divide them all juſt at the midſt M M, at the which points you ſhall ſet one leg of the Compaſs, and ſhall make the half-Circle as in the firſt. Thoſe which are view'd in front, and thoſe which are view'd on the ſide, are ordered in the ſame manner, as may be ſeen in the firſt Figure.

When one would make a thickneſs or a band equal throughout all, there is need but of one Center, as O, of which they have framed the thickneſſes N P, of the figures below: All the reſt is made, as we have ſaid, drawing to the point of ſight K: Theſe two laſt figures ſhew how all kind of ſingle Vaults, or bending Roofs ſhould be made, which have but an half-round; One may enrich them, as we ſhall ſhew hereafter.

1. fig



2. fig



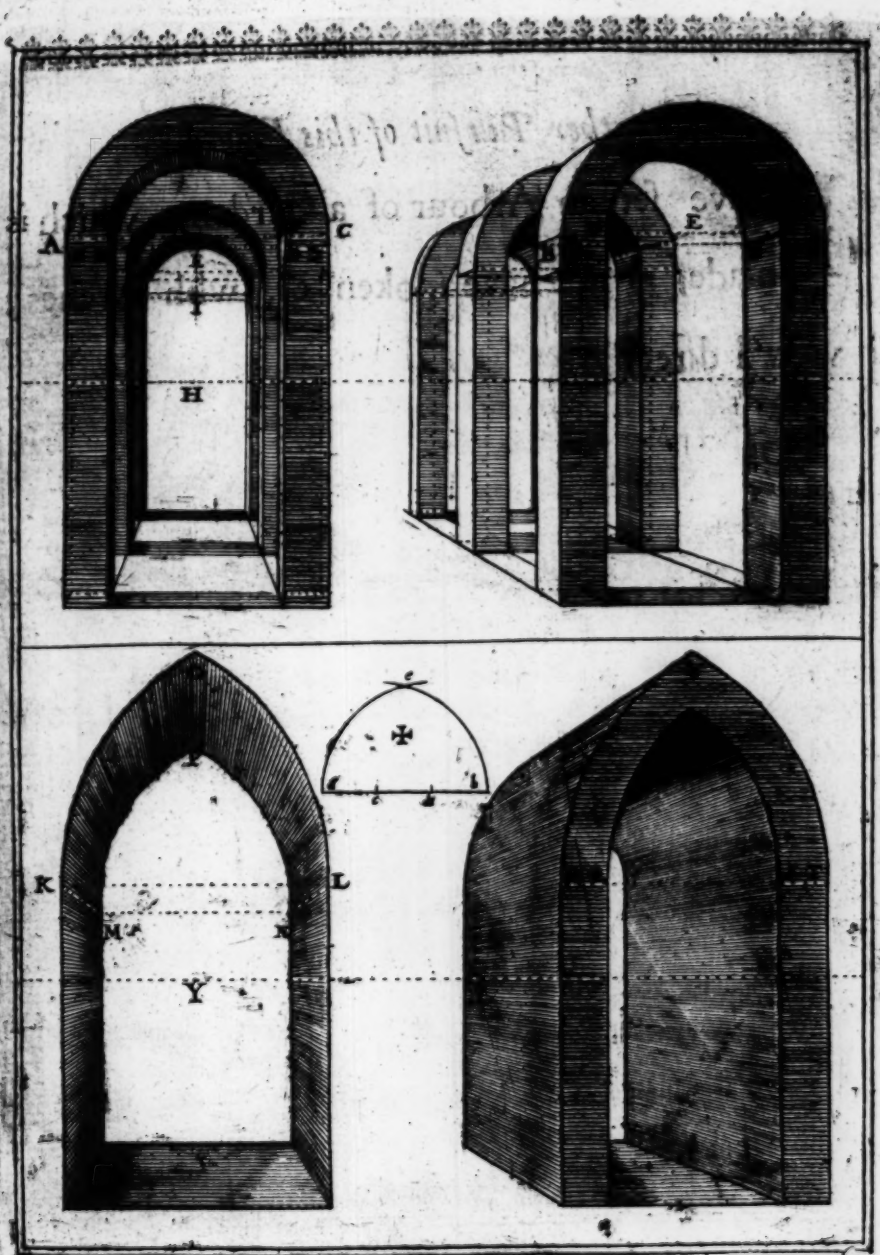
Round Arches above the Pilasters view'd directly.

THE single draught that we are about to pass from, giveth the means to make this, being the same Order, there are a few more draughts, and not more difficulties, for having drawn from above the Pilasters A B C D, Parallels to the base. We must divide the first into two, and from the center I, to make with a Compass the first half-Round A B, and without stirring it from the same center, to make the band A G F C: Then drawing from this center E, to the point of sight H, the Ray E H, will give all the Middles of the Parallels for to make half-Rounds above all, beginning at B D until the last I. This is the same order for that on the side.

Of the third Point in the Arch.

THE draught is as easie as of the Round: When one hath given the bredth, as K L, set a leg of the Compass in K, and turn the other towards O, which will frame the Arch L O, set again the compass in L, and make the Arch K O, you shall have one Arch in the third point K O L, do as much with M N, you shall have the second Arch of the bottom M P N: The second figure of the third Point is with a Band or Border about it, which is made from the same Center; for example, from the Center R, they make the Arch S X and T V: And from the point S, the Arch Q V, and R X. All the rest draweth to the point of sight Y.

The true third Point is the Figure H, they divide the Diameter *a b* into three equal Parts, then they set one leg of the Compass in one division as *c*, and with the other leg they take the opening *c b*, for to make the Arch *b e*: then setting again the compass in *d*, they make the Arch *d a*, which is an Arch in the third point as well as the other, you may use which you will. The Ancient Churches come nearer to the first then the second: there are also some which are more close.


A
C
I
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N
Y

A further Purſuit of this Figure.

I Have ſet an Arbour of a Garden, which is made, as we have ſpoken of, with Arches, view'd directly.

61

A further Purſuit of this Figure.

I Have ſet an Arbour of a Garden, which is made, as we have ſpoken of, with Arches, view'd directly.

61

For to frame and ſet into Perſpective Doors and round Arches.

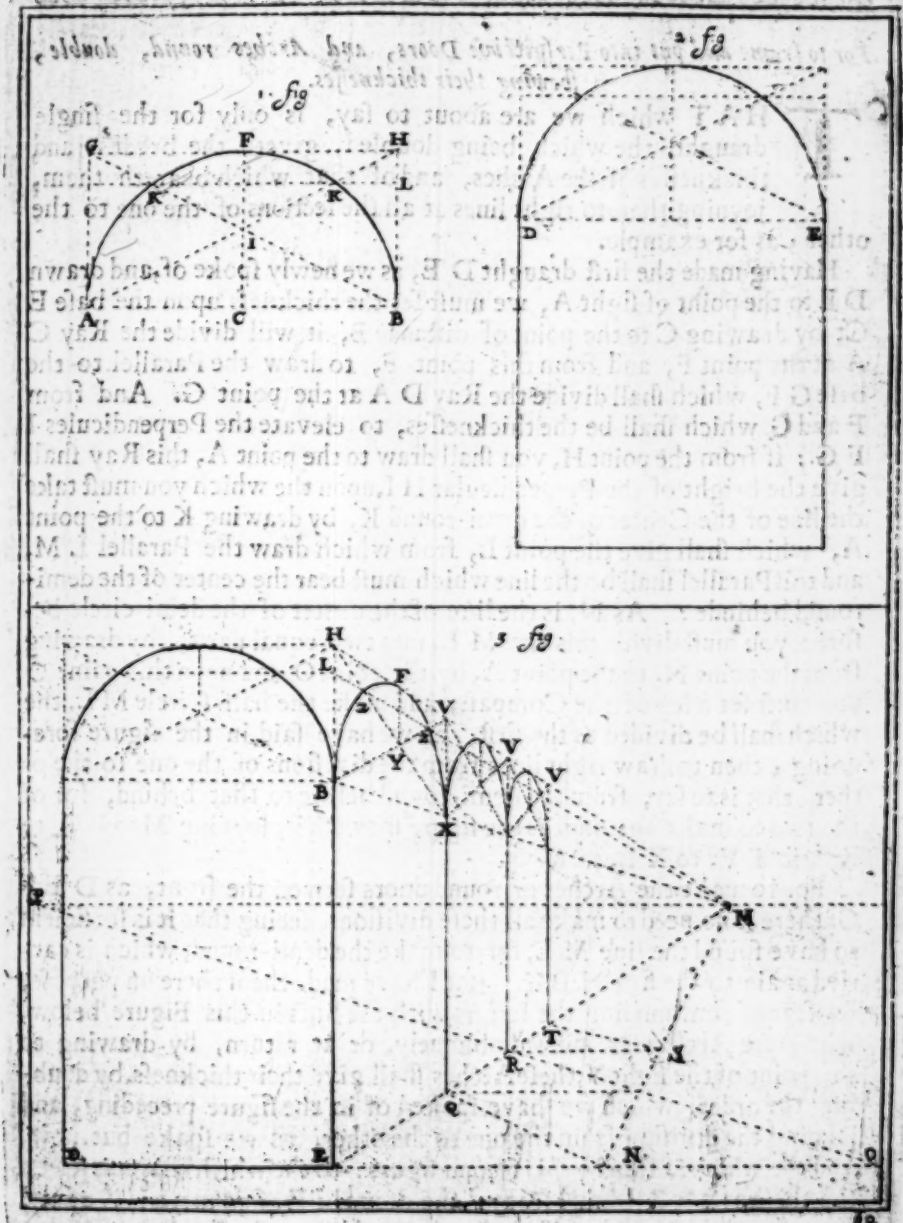
THE Round being hard to ſet into Perſpective, hath need of lines and of points which go before it, ere it can be framed: And for to finde theſe points the more eaſily, we muſt underſtand the firſt figure, by the which we ſee, that he which would have a demi-round upon the Diameter A B, hath only to ſet a leg of the Compaſs at the midſt of A B, at the point C, and with the other leg of the Compaſs to draw a crooked line from A to B, and ſo to carry his demi-round upon the Elevation D E, for to have a Door or round Arch, as in the ſecond Figure, ſo as we have ſaid.

But for to ſet it into Perſpective, we are to divide it into as many Parts as we will: the more that one can make is always the beſt, as we have ſaid and ſhewed at the 28th. fol. and as we ſhall ſhew, ſpeaking of croſs vaulted Roofs. We will divide this into eight Parts only, four for the half: Having made the half Circle, as we have ſaid, we muſt upon the demi-round draw a Parallel to A B, which toucheth it at the point F, and this point F ſhall be the midſt above the Circle: Then to elevate from A B two Perpendiculars, which divide this Parallel F, at the points G H. And from the Corners A B G H, to draw two Diagonals A H G B, which ſhall divide themſelves in I, and from this point I, to elevate a Perpendicule C I F, which ſhall divide the Circle into two, and the Diagonals ſhall divide it into two other Parts at the points K, by the which we muſt draw a Parallel to the baſe K L. Let us tranſport all theſe diviſions and meaſures upon the third Figure, for to ſet them into Perſpective.

Firſt, draw the Corner E to the point of ſight M: Then from the point N equal to D E at the point of diſtance P, which ſhall divide the Ray E M, at the point Q. Whereby E Q will be the bredth of the firſt Arch D E, in Perſpective. Draw alſo O to the point P, it will divide the ſecond Arch at the Ray E M, or point R, not having more ſpace upon the baſe for to take the third Arch, you muſt draw from the point N to the point of ſight M; and from the point R a Parallel to the baſe R S. Seeing that R S is under the ſame Angle with E N, it is then of the ſame bredth as we have proved from the beginning: Drawing then from S to P, it will divide the Ray E M, at the point T, which ſhall be the third Arch.

We muſt then elevate the Perpendiculars V, from theſe three Points Q R T, the which ſhall be divided by the Ray H M, which ſhall be the higheſt of the Arches. Then from the Ray B M, which ſhall give the lower part of the demi-round, draw Diagonals from the points B V H X, which croſſing themſelves, ſhall give the place of the Perpendicular Y F, which divideth the Arch into two: And drawing the Ray L M, it ſhall divide the Diagonals into two, and the Arch into four. If you joyn theſe points B Z F Z K, with crooked lines, you ſhall have the firſt Arch, and the means to make an infinite Company of the ſame faſhion. This Order ſerveth for Vaults, Arches, Doors, Bridges, and every other thing that requireth the demi-round. And therefore I let alone making the two others, ſpeaking no more.

This Order may alſo ſerve for the Windows of a Church; There is nothing elſe to do, but to make one or two Aſcents, to faſten the Glaſs.


1 fig
G
F
H
K
K
L
I
A
C
B
2 fig
D
E
3 fig
H
L
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V
Y
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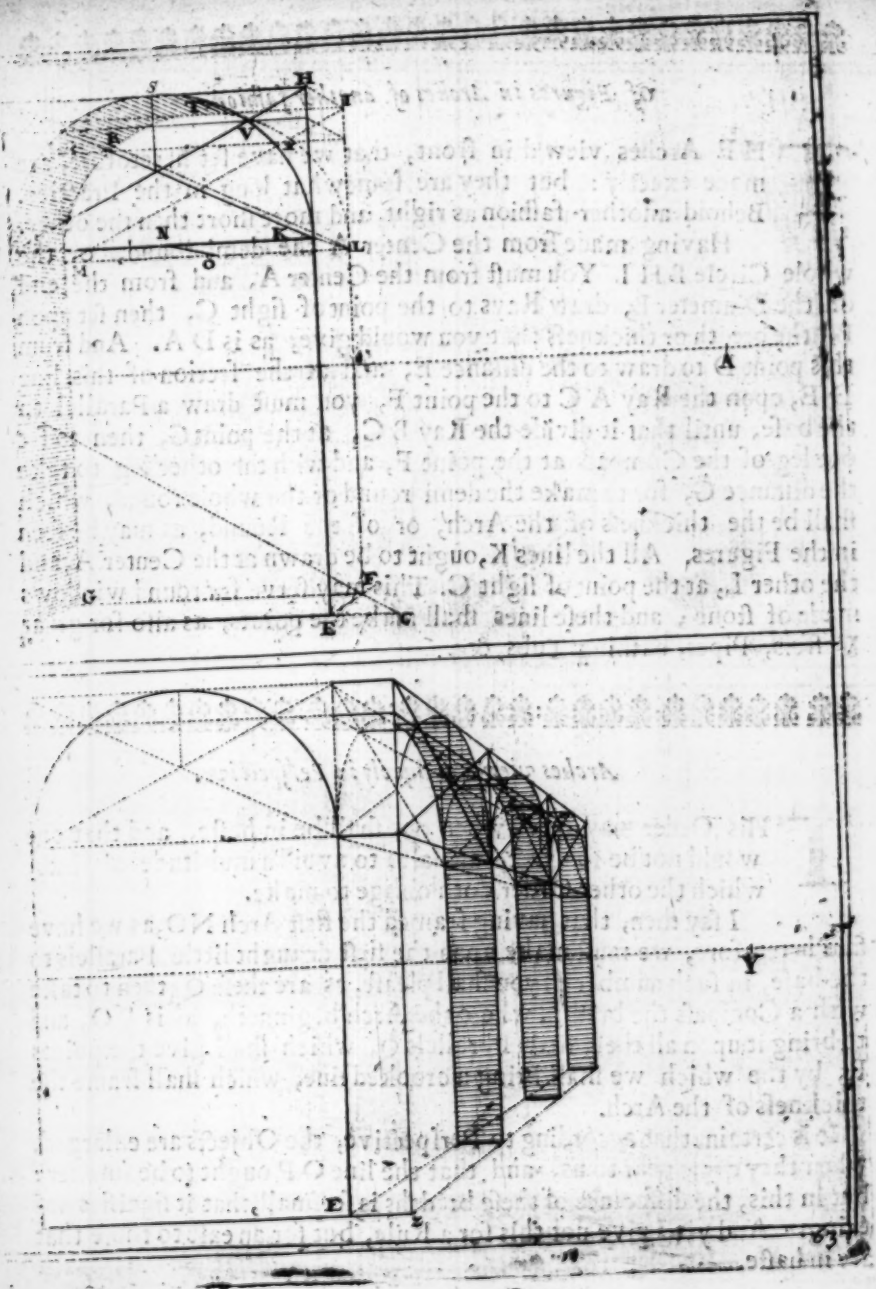
X
P
M
T
R
S
Q
D
E
N
O

For to frame and put into Perſpective Doors, and Arches round, double, ſhewing their thickneſſes.

THAT which we are about to ſay, is only for the ſingle draught, the which being doubled, giveth the bredths and thickneſſes of the Arches, and of that which beareth them, joyning thereto right lines at all the ſections of the one to the other; as for example.

Having made the firſt draught D E, as we newly ſpoke of, and drawn D E to the point of ſight A, we muſt ſet the thickneſs upon the baſe E C; by drawing C to the point of diſtance B, it will divide the Ray C A at the point F, and from this point F, to draw the Parallel to the baſe G F, which ſhall divide the Ray D A at the point G. And from F and G which ſhall be the thickneſſes, to elevate the Perpendicules I F G: If from the point H, you ſhall draw to the point A, this Ray ſhall give the height of the Perpendicular H I, upon the which you muſt take the line of the Center of the demi-round K, by drawing K to the point A, which ſhall give the point L, from which draw the Parallel L M, and this Parallel ſhall be the line which muſt bear the center of the demi-round behinde: As N, is the line of the center of the demi-circle before: you muſt divide this line M L, into two equal parts, by drawing from the point N, to the point A, by the point O, and upon this point O you muſt ſet a leg of the Compaſs, and make the half-Circle M L, the which ſhall be divided as the firſt, as we have ſaid in the figure foregoing; then to draw right lines from the diviſions of the one to the other; that is to ſay, from the demi-round before to that behind, for of the two to make but one. as the figure ſheweth it, joyning M to P Q, to R S, to T V, to X L, to K.

For to make the Arches or round doors ſeen on the front, as D E F G, there is no need to make all theſe diviſions, ſeeing that it is ſufficient to have found the line M L, for to make the demi-round, which is carried again to the firſt N P K. But I have made them there on purpoſe, for fear of confounding the letters with the lines in this Figure below, where the Arches are view'd obliquely, or at return, by drawing to the point of the ſight Y, theſe Arches ſhall give their thickneſs, by doubling the order, which we have ſpoken of in the figure preceding, and joyning the diviſion from the one to the other, as we ſpake but now, and the which is ſeen in this ſecond figure: to the which having given the thickneſs E Z, I have framed the draught E of points, and Z of full lines, thereby to avoid confuſion: and to make to underſtand, that all that which s made of Points ought not to be ſeen, the Picture being finiſhed.


S
H
T
V
R
N
K
L
O
A
G
F
E
Y
E

Of Figures in Arches of another faſhion.

THE Arches view'd in front, that we have ſet heretofore, are made exactly: but they are ſomewhat long in the Practice. Behold another faſhion as right, and more ſhort then the other.

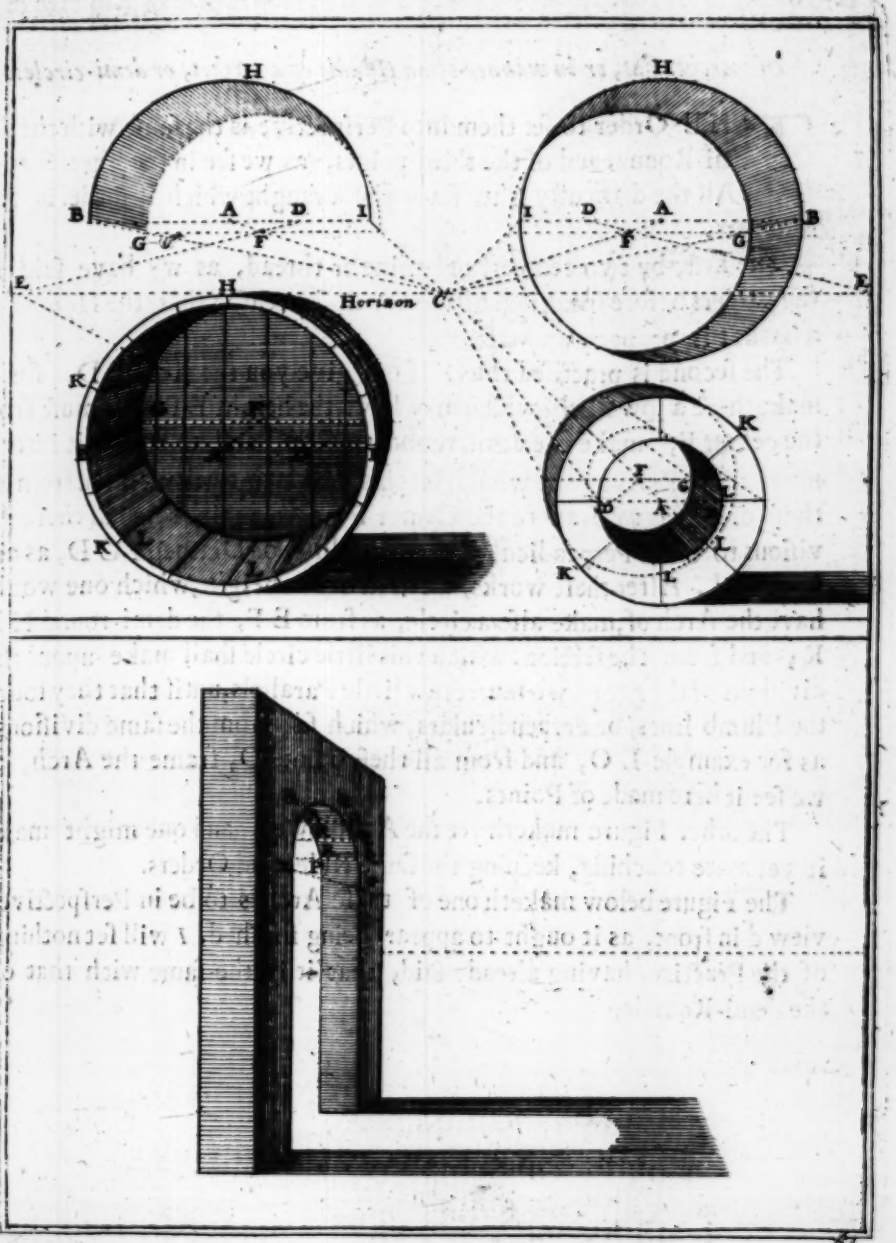
Having made from the Center A the demi-round, or the whole Circle B H I. You muſt from the Center A, and from the end of the Diameter B, draw Rays to the point of ſight C, then ſet upon B I the bredth or thickneſs that you would give, as is D A. And from this point D to draw to the diſtance E, and at the ſection of this line D E, upon the Ray A C to the point F, you muſt draw a Parallel to the baſe, until that it divide the Ray B C, at the point G, then to ſet one leg of the Compaſs at the point F, and with the other leg to take the diſtance G, for to make the demi-round or the whole round, which ſhall be the thickneſs of the Arch, or of the Round, as may be ſeen in the Figures. All the lines K, ought to be drawn at the Center A, and the other L, at the point of ſight C. This may ſerve for round windows made of ſtone; and theſe lines ſhall make the points, as alſo for great Veſſels, Pipes, bathing Tubs, &c.

Arches view'd obliquely in Perſpective.

THis Order may ſerve when one ſhall be in haſte, and that one would not be ſo exact, and alſo to avoid a multitude of lines, which the other Order doth oblige to make.

I ſay then, that having framed the firſt Arch NO, as we have ſaid heretofore, we muſt make upon the firſt draught little Parallels to the baſe, in ſuch number as you ſhall pleaſe, as are theſe Q; then to take with a Compaſs the bredth, where the Arch beginneth, as is P O, and to bring it upon all theſe little Parallels Q, which ſhall give the points R, by the which we ſhall bring a crooked line, which ſhall frame the thickneſs of the Arch.

It is certain, that according to Perſpective, the Objects are enlarged, when they come near to us, and that the line O P ought to be ſmaller: but in this, the difference of theſe bredths is ſo ſmall, that it ſignifies nothing. And yet I give not this for a Rule, but for an eaſe to thoſe that are in haſte.


H
B
A
D
I
G
F
E
C
Horizon
K
L

Of Arches flat, or in manner of an Handle of a Basket, or demi-circles.

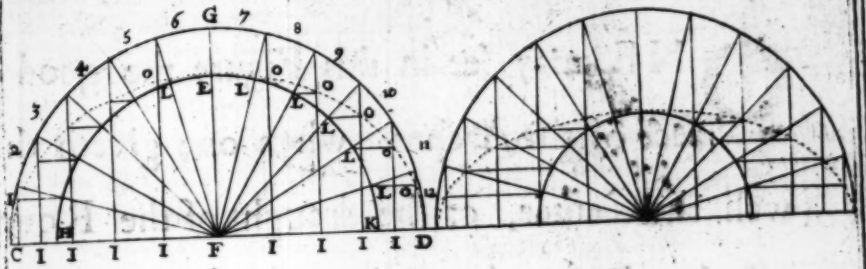
THE Order to ſet them into Perſpective, is the ſame with the demi-Round, and of the third points, as we ſee in the Figure A B. All the difficulty is to finde the draught which is made in two Manners.

The firſt, by two centers, and a line or thread, as we have ſaid in the Orders before ſpeaking of the Oval, by reaſon that the Handle of a basket is properly an half-oval.

The ſecond is practiſed thus: If one give you the line C D, for to make there a low Arch, which may have the height E F: you muſt from the center F, make the demi-round C G D, and to divide it into as many equal Parts as one would, as this here into twelve; and from all thoſe diviſions to draw to the Center F: then again from all theſe diviſions to draw Perpendiculars upon the line, or Diameter C D, as are the lines L. After theſe works, we muſt of the height, which one would have the Arch of, make alſo a circle, as from E F, the demi-round H E K; and from the ſections which this little circle ſhall make upon the diviſions of the great, we muſt draw little Parallels, until that they touch the Plumb-lines, or Perpendiculars, which fall from the ſame diviſions; as for example L O, and from all theſe points O, frame the Arch, as we ſee it here made of Points.

The other Figure maketh yet the Arch lower, and one might make it yet more couching, keeping the ſame Rules and Orders.

The Figure below maketh one of theſe Arches to be in Perſpective, view'd in front, as it ought to appear, being finiſhed. I will ſet nothing of the Practice, having already ſaid, that it is the ſame with that of the demi-Rounds.


G
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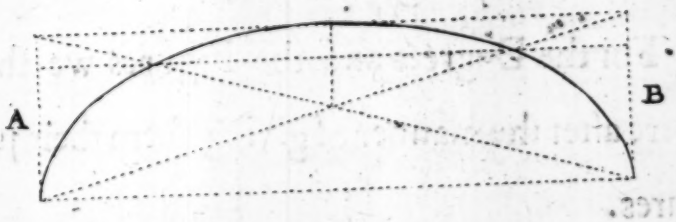
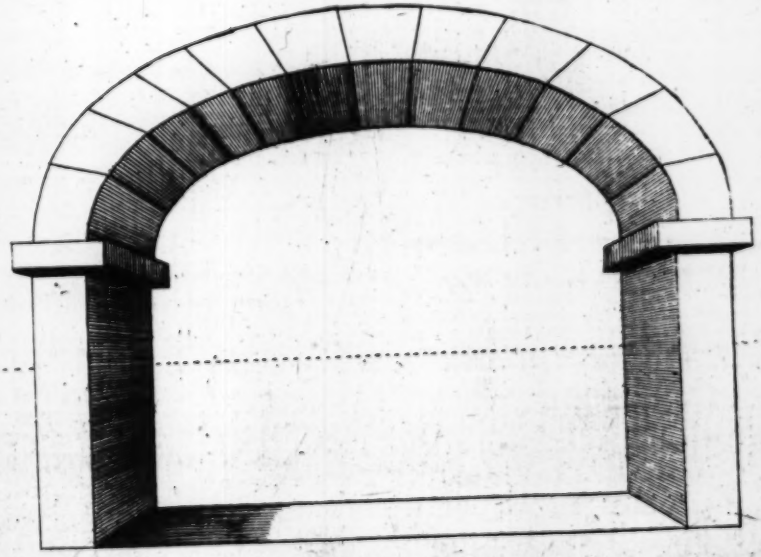
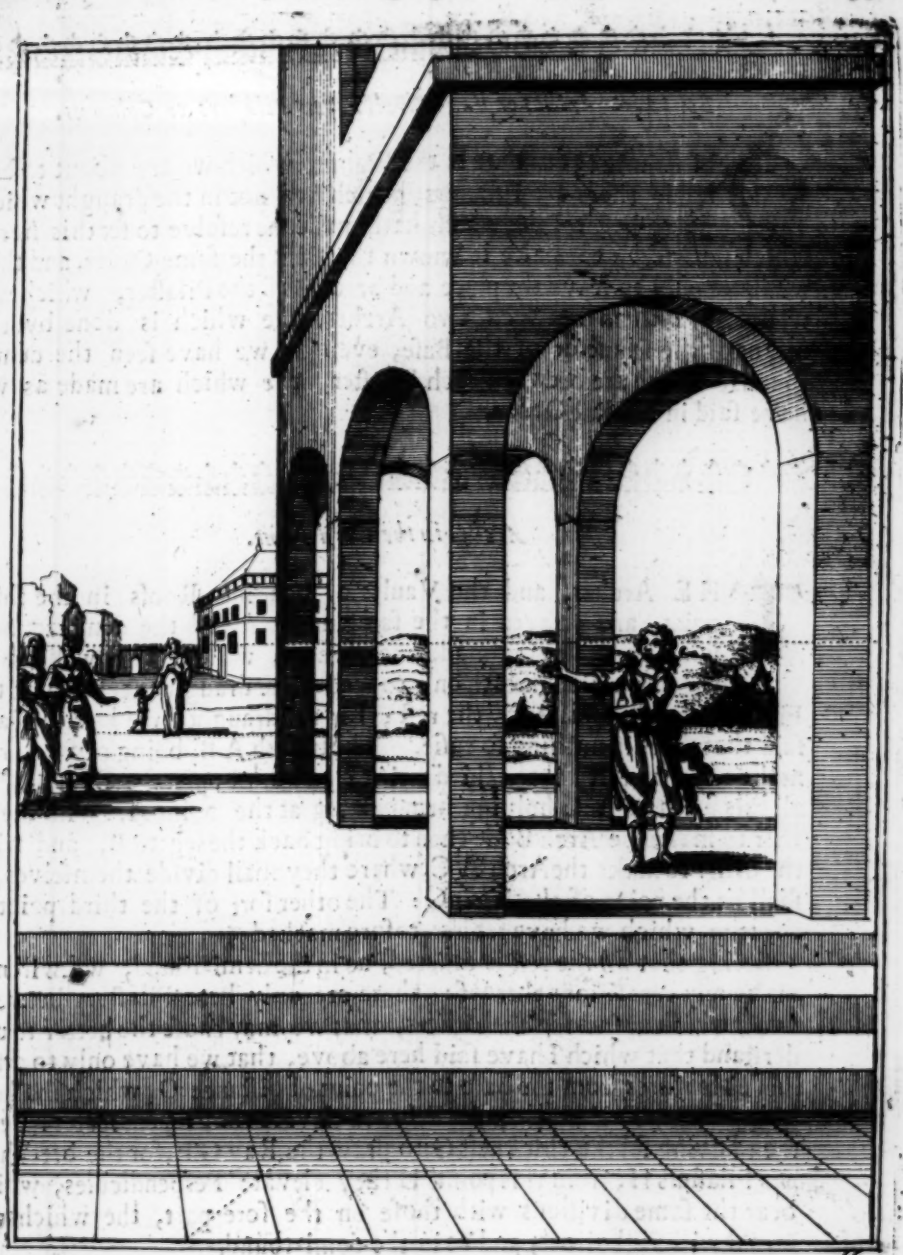

A
B



ONE may ſee in this Figure the good effect of the Arches, when one giveth them well the Center, or the draught of the Roundneſs that they ought to have,

For the Degrees and the Figures we ſhall have here after the manner of giving them their juſt Meaſures.



66

S.

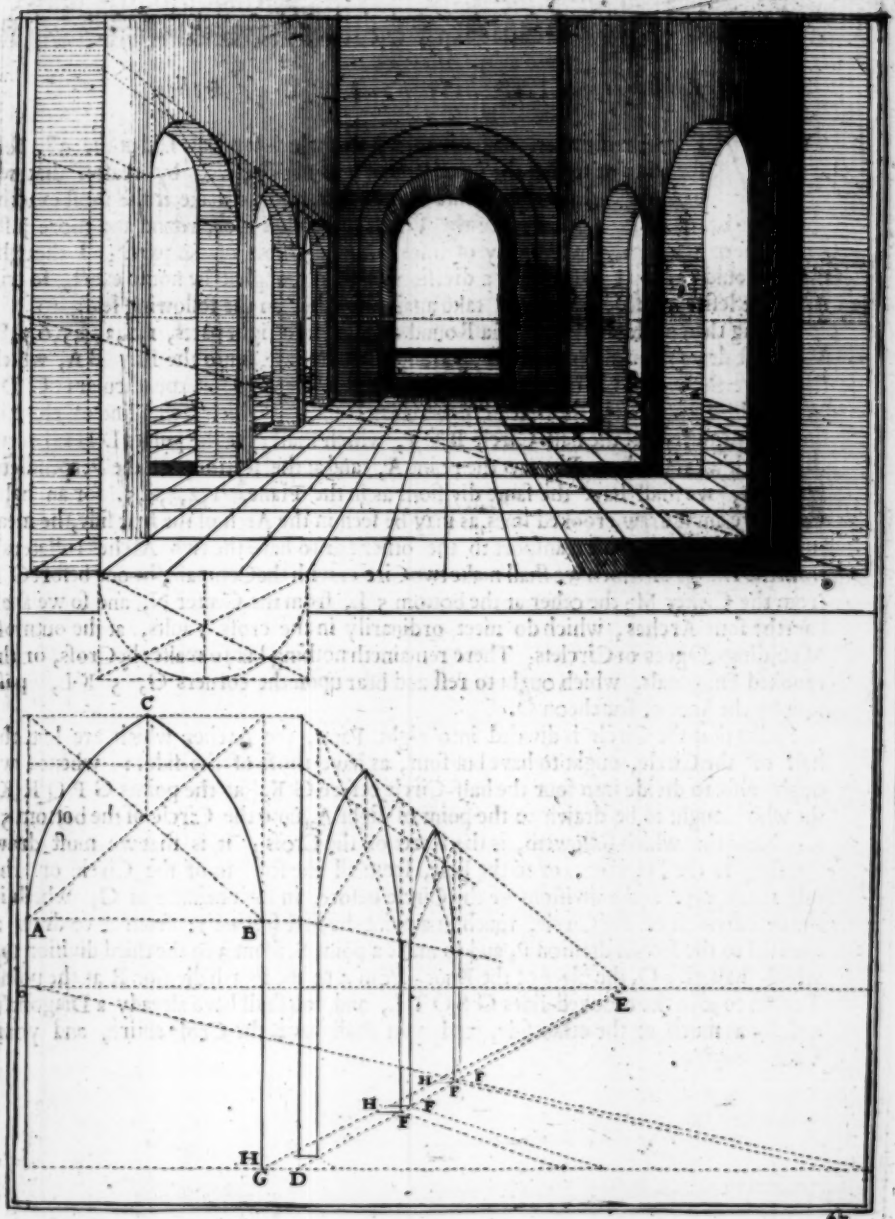
For to set Arches or half-Circles upon Pilasters or Columns.

ONE might say that in the Figure, which we are about to behold, there are Pilasters, which are not in the draught which goeth before, the which hath made me resolve to set this here, which shall serve to make it known that it is the same Order, and that we have only to leave the place and bredth of the Pilaster, which we would give them between two Arches, the which is done by the means of the Plane or of the Base, even as we have seen the demi-rounds, which are between each Pilaster, the which are made as we have said in the last Order.

Arches in the third Point.

THE Arches, and the Vaults or bending Roofs in the third point, are ordered in the same manner with the demi-round; wherefore, having made one of them, we may very well make the other: it sufficeth only to know the draught, seeing that the Figure sheweth sufficiently the rest; for the draught, we have already said that there is nothing so easie. The bredth A B being given for to make there an Arch in the third point; we must open the Compass for all this bredth; and holding firm one leg at the point A, with the other to make the Arch B C, then to bring back the leg to B, and with the other to make the Arch A C, where they shall divide themselves, it shall be the point of the Arch C: The other sort of the third point is the true, which we have set heretofore marked ✠

Seeing that all the rest is ordered, as in the demi-round, we will not make any repetitions thereof: there are only here Pilasters between two, which are not in the others, that we may cause the better to understand that which I have said here above, that we have only to draw these Measures from the base to the point of distance O, which shall divide the Ray D E at the point F, for to elevate the Perpendicules before: then having set the thickness G, to draw the Ray G E, for the bredth of the Pilasters H, from this point H they elevate Perpendicules, which bear the same divisions with those on the fore-part, the which are joyn'd with right lines, and as in the demi-round.

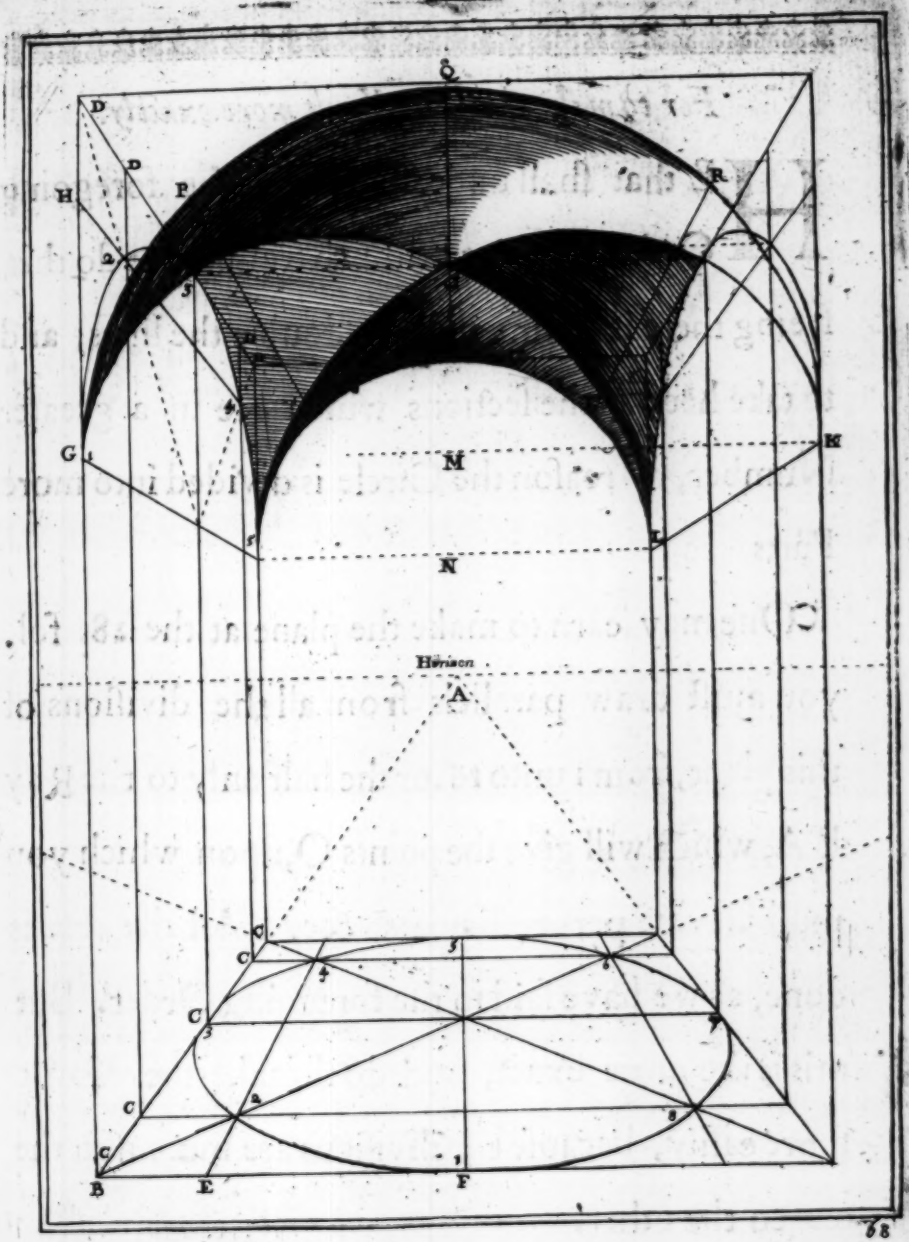

C
A
B
E
H
F
G
D
67

For to ſet into Perſpective Vaults or Croſs Arches.

WE muſt remember, or ſee it anew, that which we have ſaid at the 28. fol. ſpeaking of ſetting the great Round into Perſpective, by reaſon that we have divided the Circle into many Parts, for to make it the moſt exactly that may be, and by conſequence the Vaults or Arches more round and more juſt. But as there are a great Company of lines in this diviſion of 16 parts; I thought that it would be better to begin by a diviſion of 8, although it be not ſo exact, ſo will it alſo be leſs confuſed. We will take again the other in the following leaf.

Having then made the Plane of a Round divided into eight parts, 1,2,3,4,5,6,7,8. We muſt draw from all its diviſions, Parallels to the baſe, unto the Ray B A, which ſhall give the points C, upon the which we muſt elevate the Perpendiculars C D; We muſt tranſport upon the firſt Perpendicular B and D, which is the line of elevation, the Meaſures of the half-Circle B E F, which ſhall give the points D H G; from the which we muſt draw Rays to the point A, and at the ſections of the Perpendiculars C D, we ſhall have the ſame diviſions as in the Plane, 1,2,3,4,5. for an half-Circle we muſt draw crooked lines, as may be ſeen in the Arch of the firſt ſide, the meaſures of which we muſt tranſport to the other for to have the two Arches collateral, from the riſings of which we ſhall make two Circles with the Compaſs, the one before G K from the Center M; the other at the bottom 5 L, from the Center N, and ſo we ſhall have the four Arches, which do meet ordinarily in the croſs Vaults, at the outmoſt Mouldings, Ogees or Circlets; There remaineth nothing but to make the Croſs, or the crooked Diagonals, which ought to reſt and bear upon the corners G, 5 K L, paſſing by the knot or ſcutcheon O.

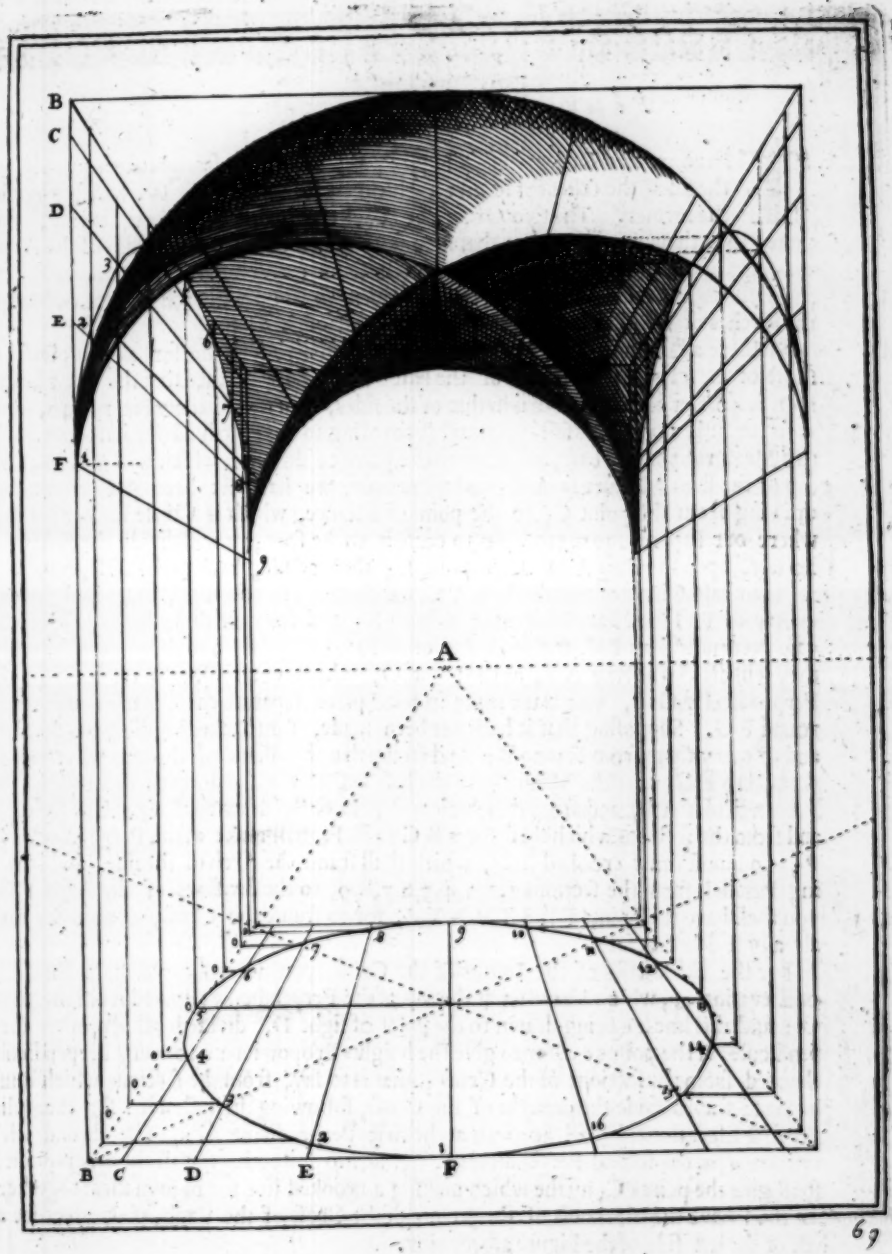
Seeing that the Circle is divided into eight Parts, the Arches which are but the half of the Circle, ought to have but four, as have thoſe of the ſides: whence we ought alſo to divide into four the half-Circle before G K, at the points G P Q R K, the which ought to be drawn to the point of ſight A, unto the Circle of the bottom 5, L; Now that which followeth, is the ſecret of the Croſs; it is that we muſt draw Parallels to the Horizon, or to the baſe, from all the ſections of the Circle on the ſide 1,2,3,4,5. at the diviſions of the Circle before, in ſuch manner as G, which is the firſt diviſion of the Circle, touch in a point the firſt ſection 1. from 2 to draw a Parallel to the ſecond diviſion P, and to make a point S, from 3 to the third diviſion Q, which ſhall give O, the place of the Knot; from 4 to the fourth diviſion R at the point T, then to joyn the crooked lines G S O T L, and you ſhall have already a Diagonal; and do as much on the other ſide, and you ſhall have the Croſs entire, and your Vault compleat.


Q
D
d
H
P
R
G
M
K
N
L
Horizon
A
C
B
E
F
68

For to make the ſame Vault more exactly.

HE that ſhall underſtand well the foregoing Order, will not be much troubled to do this, ſeeing there is nothing but to double the lines, and to take heed to the ſections which are in a greater Number, by reaſon the Circle is divided into more Parts.

One may learn to make the plane at the 28. fol. you muſt draw parallels from all the diviſions of this plane, from 1 unto 16. or the half only to the Ray B A, which will give the points O, upon which you muſt elevate perpendiculars, &c. All the reſt is done, as we have ſaid in the foregoing Order. But this is the more exact, and doth make the Vault more eaſily, becauſe the diviſions are more near the one to the other.



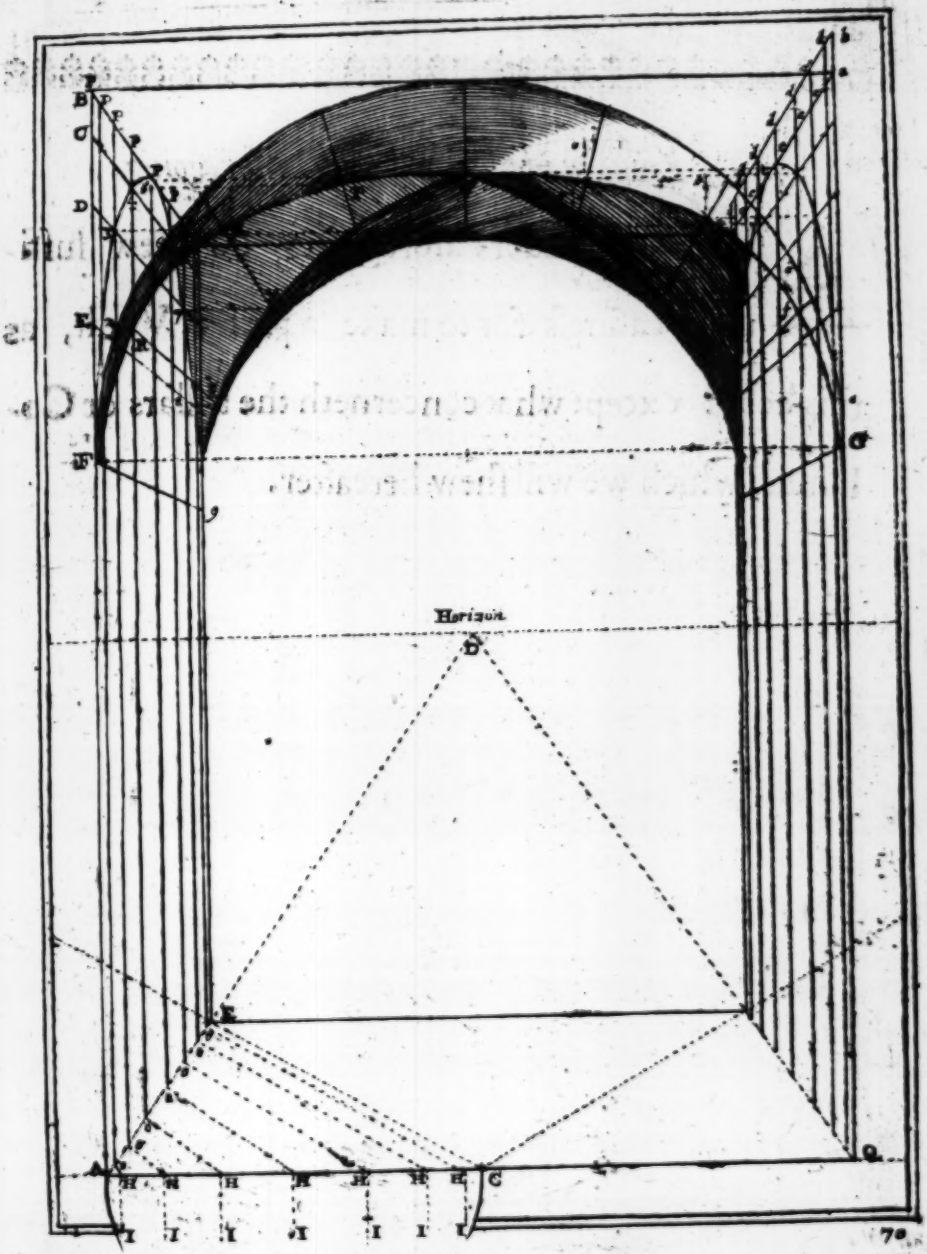
69

For to make the Vaults more ſtreight then large.

THere are two Orders in this Figure; the one for to ſtreighten the Vaults on the ſides, the other for to give a Thickneſs to the Croſs. We will begin with the former. The two Orders of Vaults, which we are about leaving, ſuppoſing that they are all ſquare; that is to ſay, that the diſtance and bredth of the Arches is equal, as well on the ſides as thoſe on the front; and he that cannot make but of this faſhion, ſhall finde ſome trouble, if he were to ſet up a Church, where ordinarily the Arches of the ſides are much cloſer then thoſe of the front.

See here a fair Invention, by the which you ſhall give ſuch Meaſure as you pleaſe, to thoſe of the ſides, by the means of the baſe A Q. Suppoſe then that the Arch before it Q, is 40 feet broad, and that in that of the ſides, you would allow but 15, 20, or ſo much or little as you pleaſe: you muſt (according to the fourth advice in fol. 17.) ſet this Meaſure upon the baſe, and draw to the point of diſtance, which will give the ſinking of the ſame Meaſure in A E; as by example, we have ſet here A C of 20 feet, drawing from the point C, to the point of diſtance, which is a little farther off here where our Paper is too narrow for to cauſe it to be ſeen; it will divide the ſinking of 20 feet, upon the Ray A D, at the point E; then coming back to the Baſe, you muſt make an half-Circle of this diſtance A C, and divide it into as many parts as the greater Arcade F G ſhall have of diviſion, as here 8; and from all theſe diviſions I, to elevate Perpendiculars I H, and from the points I H, being drawn to the point of diſtance they will divide the Ray A E, at the point O, which you muſt alſo elevate into the Perpendicular O P, you muſt make in ſome place ſeparate the Plane of this demi-round F G. Suppoſing that it hath not been made, for to take the diviſions thereof, and to carry them from E unto B: And ſeeing that the Plane of the Figure foregoing is equal to F G, take the Meaſures of the half B C D E F, and carry them upon the Perpendicules A F, and from theſe poiuts E F D C B, draw to the point of ſight D, and from the ſections which theſe Rays B C D E F, ſhall make at the Perpendicules O P; you muſt draw crooked lines, which ſhall frame the Arch of the ſide, and drawing Parallels from the ſections 1,2,3,4,5,6,7,8,9, to the diviſions of the Arch F G, you ſhall have the points F R S T V X Y Z, for to frame the Croſs, even as we have already ſaid heretofore.

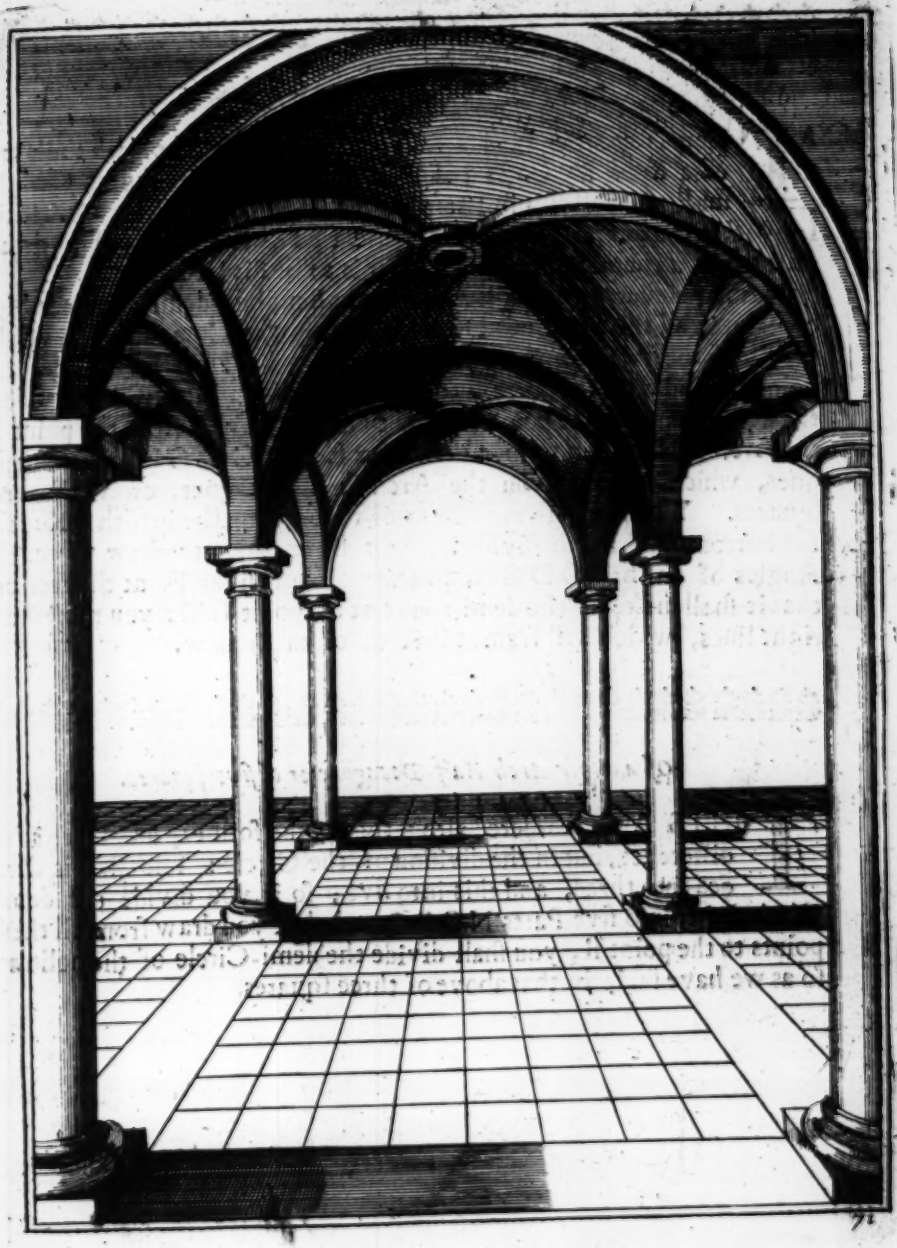
For the Thickneſſes of the Joynts of the Croſs, you are only to make a little line of Elevation *a b*, which I have ſet at the top of the Perpendicule elevated from the point O: and this line *a b* being drawn to the point of ſight D, divideth all the other Perpendicules at the points *c d*, for to give the heights Proportionate to every Perpendicule elevated from the ſections of the Croſs; that is to ſay, from the ſections which muſt be made for to finde the draught of the Croſs, following their Order: for example, the firſt Elevation *a b* ſhall be given at the firſt Perpendicule G: The ſecond Elevation *c d*, at the ſecond Perpendicule F, *c*; and ſo following for all the others, which ſhall give the points C; by the which making a crooked line for to joyn them together, we ſhall have the thickneſs of the Joynts of the Croſs of the Vault, as one may ſee at half of the left ſide of the Figure aforegoing.



T.

A Vault made by the Orders aforegoing.

ALL the Orders aforegoing, do ſhew ſufficient eaſineſs for to make a perfect Vault, as this here: except what concerneth the Pillars or Columns, which we will ſhew hereafter.



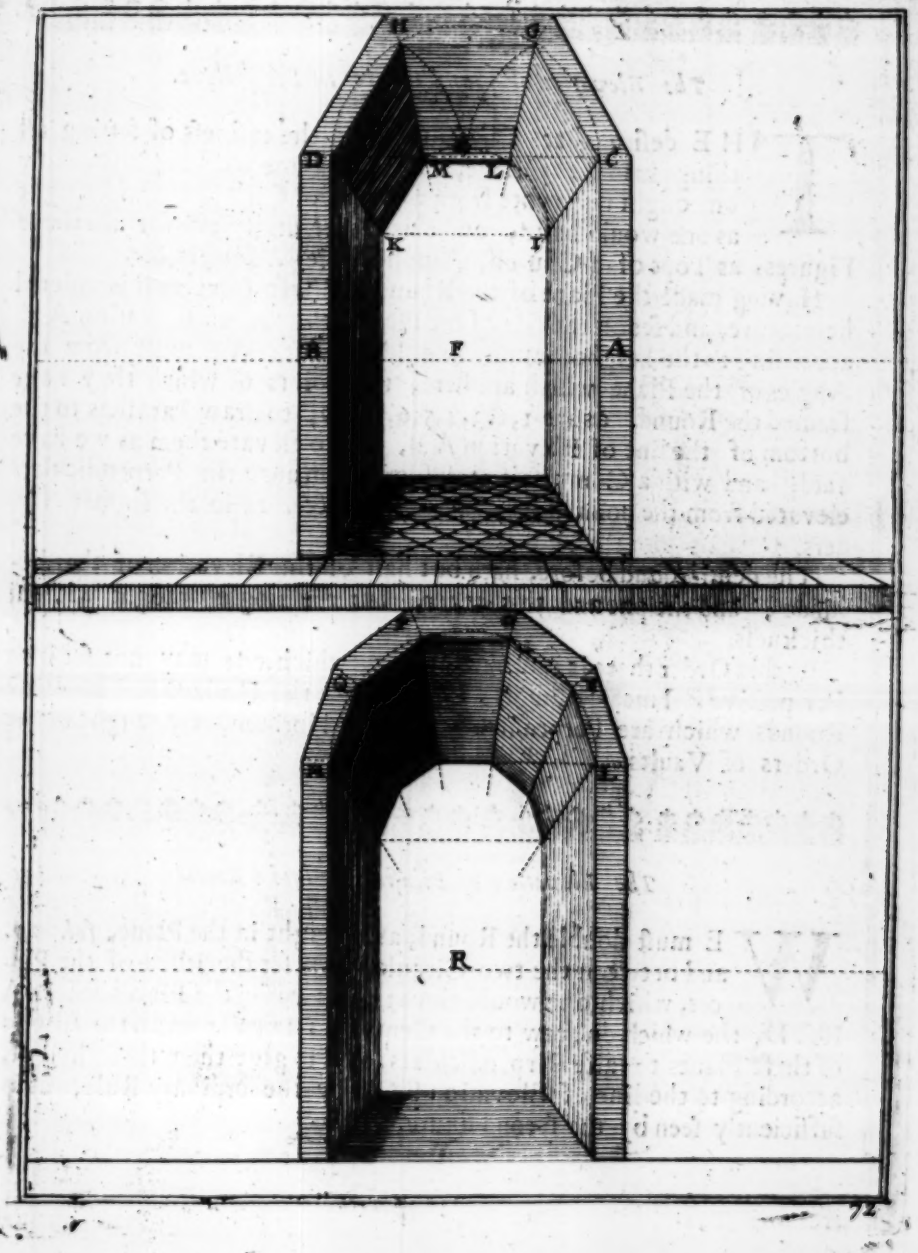
Of Arches and Doors with three squares.

THere is another kind of fretted cieling, which holdeth the place of a Roof for Gates and Galleries, and also in Churches, which maketh well also in Perspective; and is very easie to practise: I have set it after the Round, because that it is framed of a demi-Circle, as a round door, which after is to be divided.

Having elevated the walls A B, we must make a demi-Circle, which containeth all the bredth C D, then holding the Compass open of the bredth of the half Diameter E C, you must hold one leg firm at the point C, and with the other E to draw an Arch on high, which divideth the demi-round at the point G, and to make likewise from the point D the Arch E H. Then to joyn these four Letters C D G H, with right lines, which will give you the Arch half-Hexagone, or with three squares. You must also make a demi-round, upon the bredth I K: for the bottom, and for to divide it, you have only to draw from the Angles of the first C D G H, to the point of sight F, at the sections that it shall make of the demi-round at the point L M: you must draw right lines, which will frame the Arch of the hollow.

Of another Arch Half-Decagone, or of five squares.

THIS Arch is ordered altogether as the former, and there is no difference, but in the division of the Circle: The first is divided into three, and this into five; so if you divide the demi-Circle L M, into five Parts N O P Q, and that you draw from all these points to the point R, you shall divide the demi-Circle of the hollow: so as we have said, in that above of three squares.


H
G
D
M
L
C
K
I
F
B
A
R

The Elevation of round Figures in Perſpective.

THE deſire that I have to ſhew the eaſineſs of ſetting all things into Perſpective, hath made me ſet here alſo, how one ought to elevate from a Round or Circle, ſuch an height as one would have; and this Order ſhall ſerve for all round Figures, as Tops of a Church, Amphitheaters, Towers, &c.

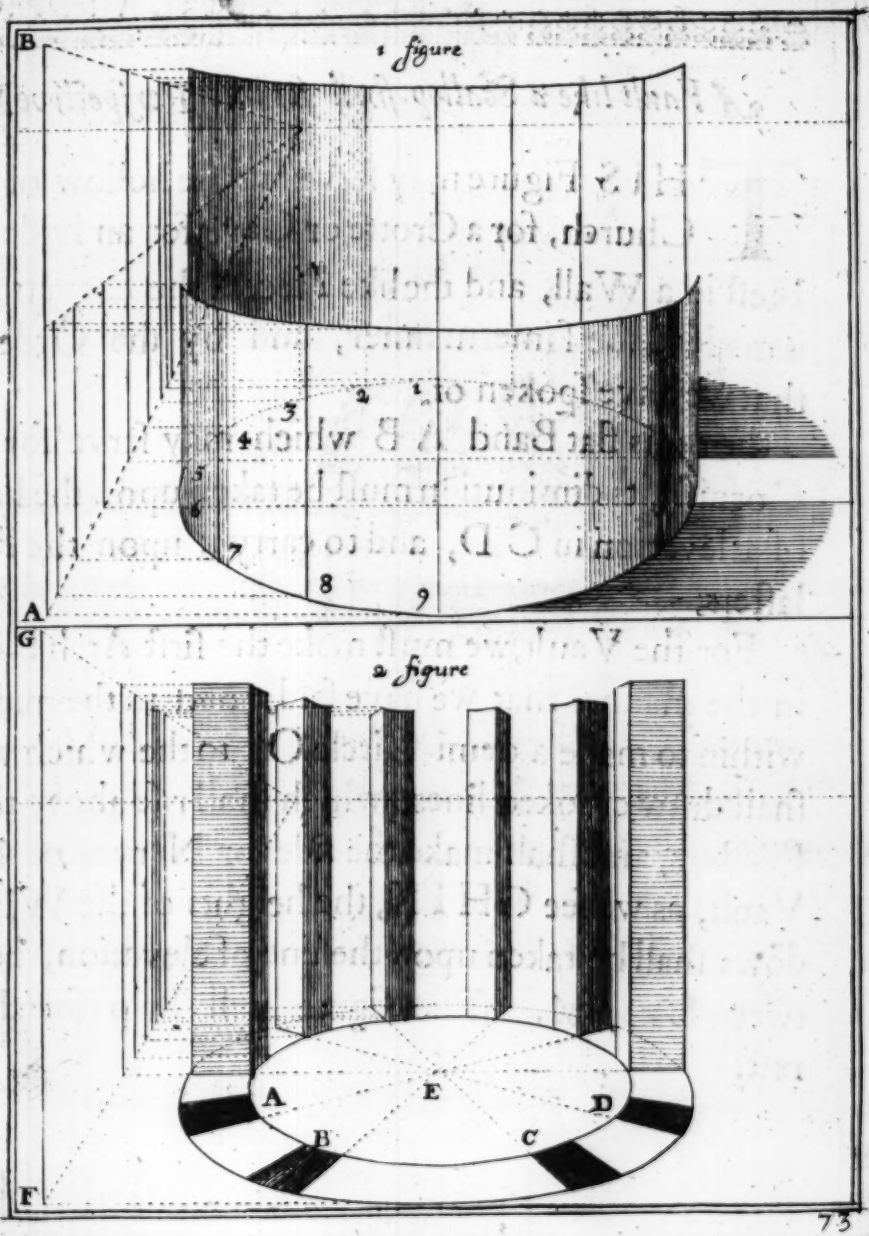
Having made the Plane of the Round in Perſpective, as it is ordered heretofore, and ſet on the ſide of the Plane, the line of Elevation A B, according to the height that one would give it: We muſt from the Angles of the Plane which are here, the Points of which they have framed the Round, as are 1,2,3,4,5,6,7,8,9, to draw Parallels to the bottom of the line of Elevation A B, and to elevate them as we have ſaid, and with a Compaſs to tranſport them upon the Perpendiculars elevated from the points 1,2,3,4,5,6,7,8,9, &c. as in the former Orders.

The demi-round before, hath but half of the Elevation of that behinde; and the one and the other, but the ſingle draught without thickneſs.

By this Order there is no round thing, which one may not ſet into Perſpective; I mean Rounds, Parallels to the Horizon; The other Rounds which are Perpendiculars to the Horizon, are taught in the Orders of Vaults.

The Elevation of Pilaſters ſet into a Round.

WE muſt double the Round, as is taught in the Plane, *fol.* 29. and between the two Circular lines ſet the Plane of the Pieces, which one would elevate, as we ſee the Places before A B C D, the which do draw to the Center E; Then from all the Angles of theſe Planes to raiſe Perpendiculars, and to give them their height, according to the line of Elevation F G, by the ordinary Rule, as is ſufficiently ſeen by the ſecond figure.

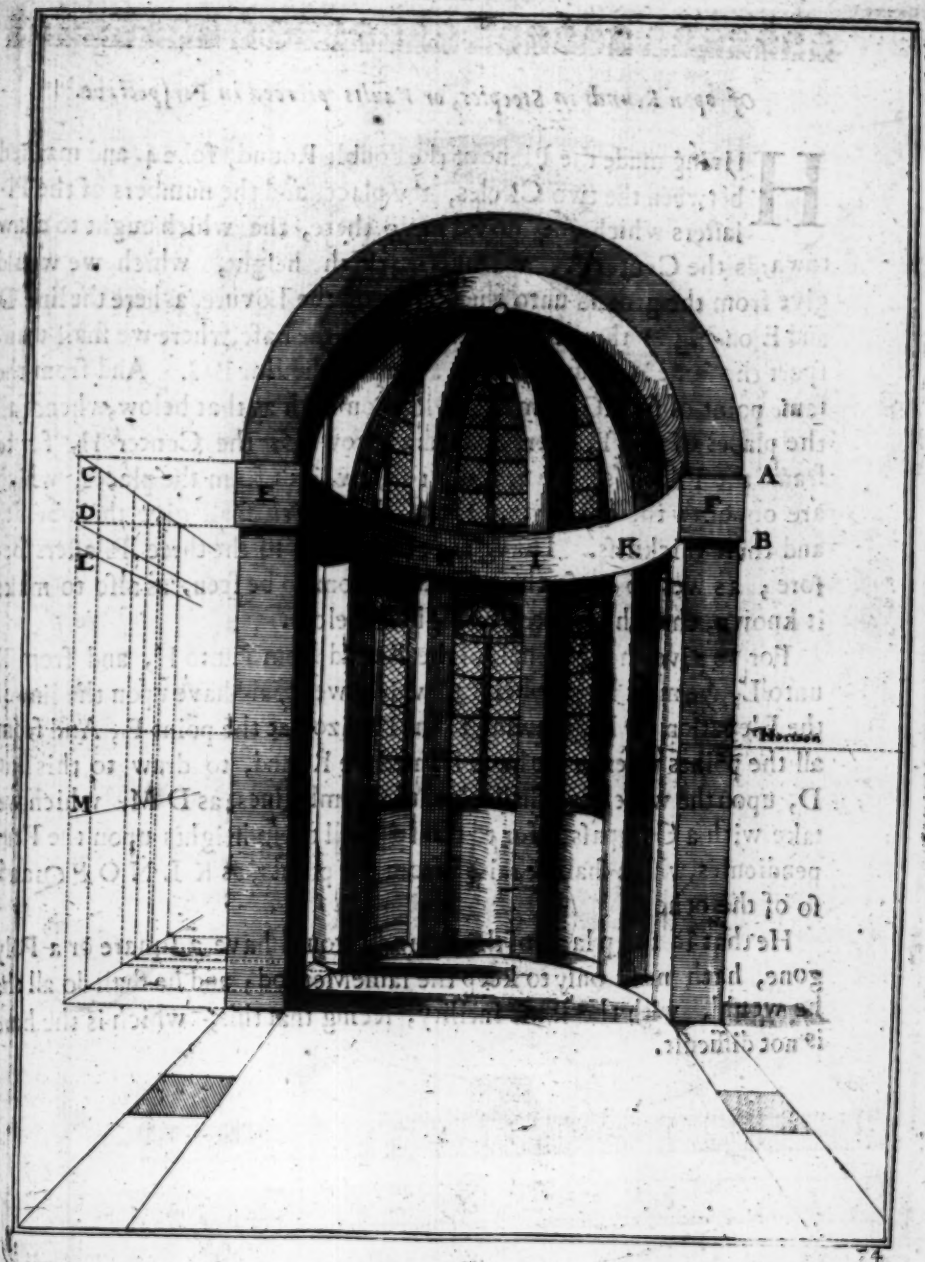

B
1 figure
1
2
3
4
5
6
7
8
9
A
G
2 figure
A
E
D
B
C
F

A Vault like a Scallop-shell set into Perspective.

THIS Figure may serve for the hollow of a Church, for a Grotte or Cave, for an hollow Nest in a Wall, and the like Pieces; the Elevation is made in the same manner, and by the Orders that we have spoken of.

For this flat Band A B which may serve for a Cornish, its diminution must be taken upon the line of Elevation in C D, and to carry it upon the Pilasters.

For the Vault, we must make the first Arch E F, in the manner that we have said, and in the midst within to make a demi-Circle O, to the which we shall draw crooked lines, which shall rise above the Pilasters, and shall make the sides or Nerves of the Vault, as we see G H I K, the heights of the Windows shall be taken upon the line of elevation, between L and M. The figure will help for the rest.

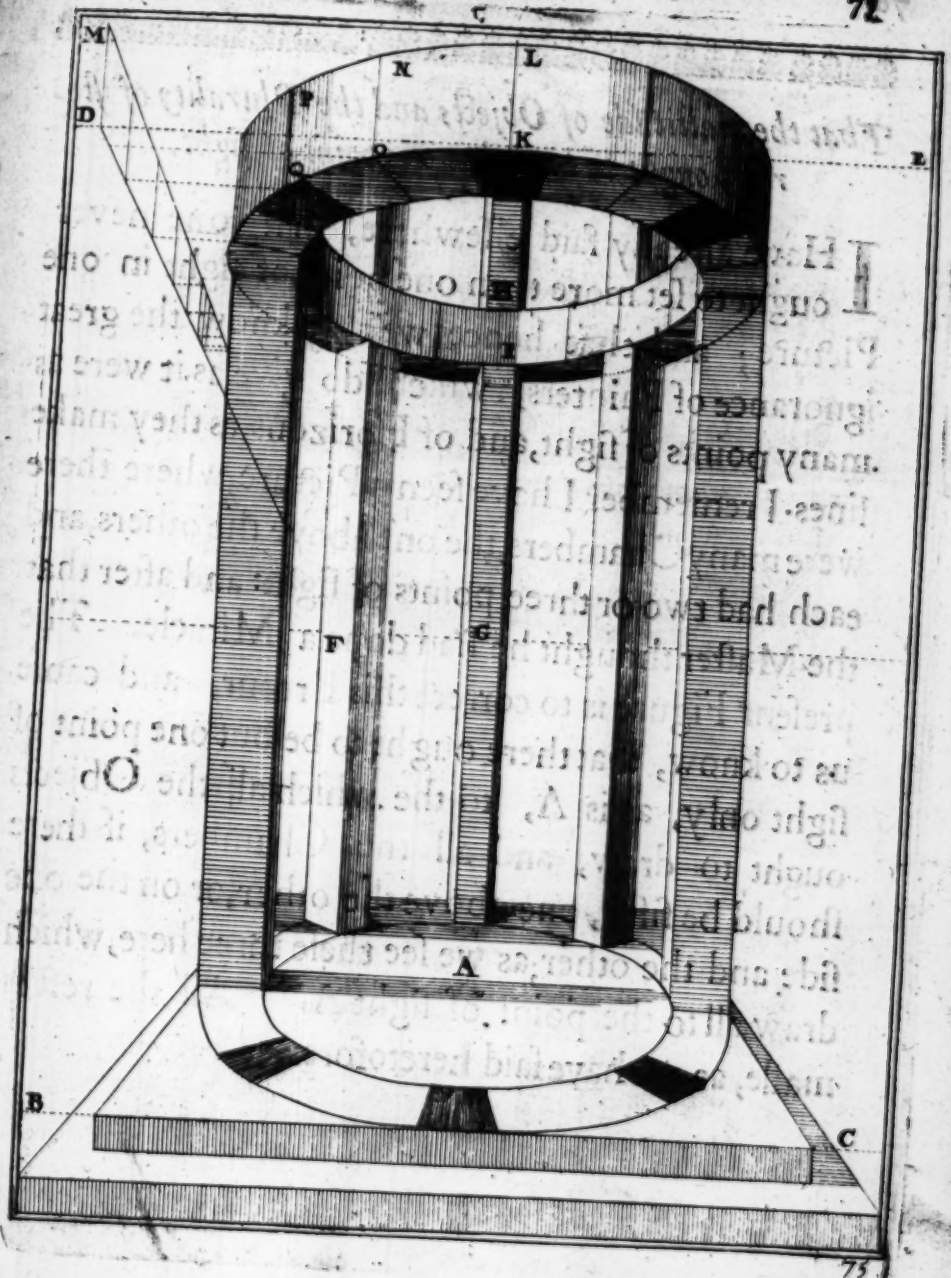

C
D
L
E
F
A
B
I
K
Horizon
M

Of open Rounds in Steeples, or Vaults pierced in Perspective.

HAving made the Plane of the double Round, fol. 24. and marked between the two Circles, the places and the numbers of the Pilasters which one would have there, the which ought to draw towards the Center A; we must mark the height, which we would give from the ground unto the hollow of the Lovure, as here the line D and E on high: the which must serve for the base, where we shall transport the same Measures, which are upon the line B C. And from the same point of sight G, to make a Plane on high as that below, whence all the places of the Pilasters shall draw towards the Center H, for to frame the Pilasters, we are only to draw lines from the places, which are opposite the one to the other, and which shall give their bredth and their thickness. I have not drawn lines to the three Pilasters before; as well to cause these of the bottom to be seen, as also to make it known, that there needs on high, as below.

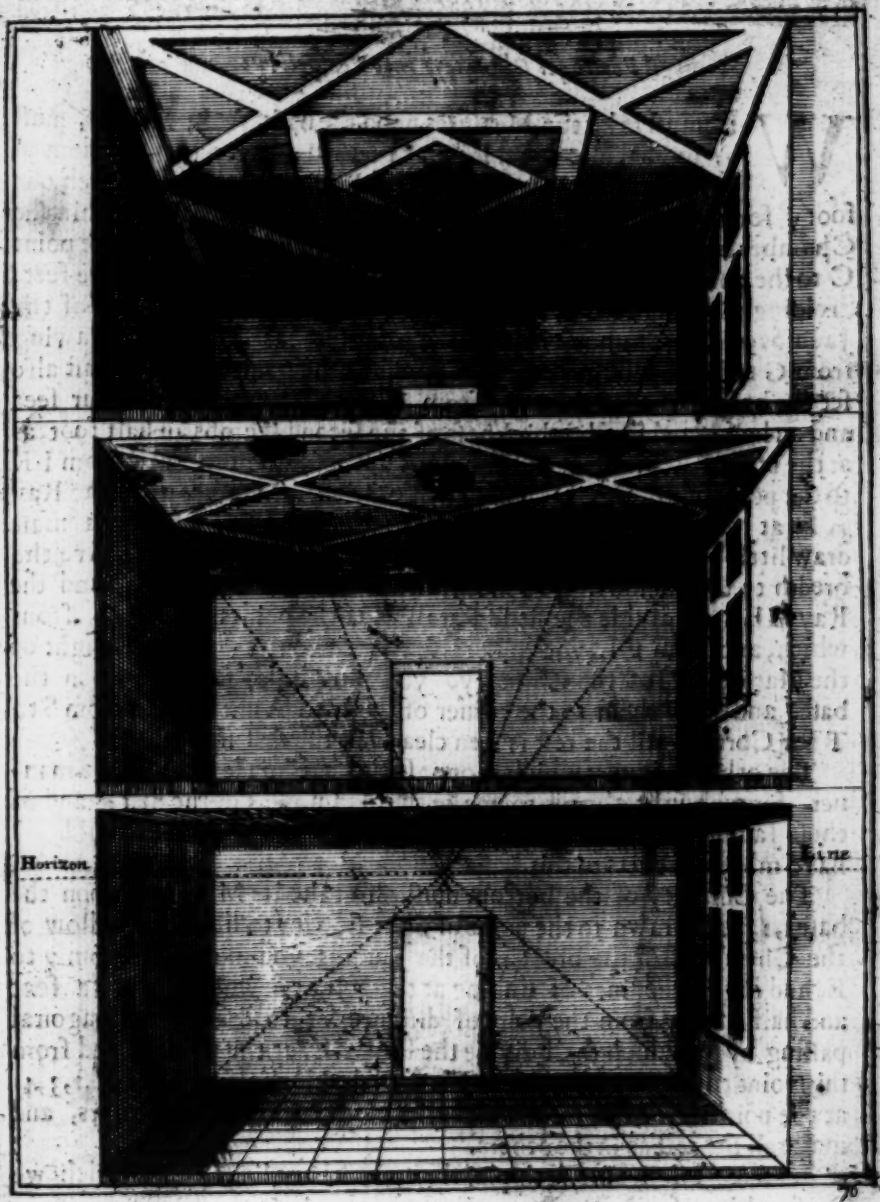
For to give the thickness of the Round from I unto H, and from K unto L, we must set the height, which we would have upon the line of the Elevation D M, drawing to the Horizon at the point F; And from all the points whence we have framed the Round, to draw to this line D, upon the which we shall elevate Plumb-lines, as D M, which we take with a Compass, for to transport all these heights upon the Perpendicules, which shall be raised from the points, as K L N O P Q and so of the others.

He that in the place of the Round, would have a square or a Polygone, hath need only to keep the same Method; and he shall do all that he would, with the same facility, seeing that this, which is the hard is not difficult.


M
N
L
D
K
E
F
G
A
B
C
75

That the multitude of Objects and the Plurality of stories, ought to have but one point of sight.

I Have already said elsewhere, that one never ought to set more then one point of sight in one Picture; and that hence we may know the great ignorance of Painters, which do give as it were as many points of sight, and of Horizons, as they make lines. I remember I have seen a Picture, where there were many Chambers, the one above the others, and each had two or three points of sight: and after that the Master thought he had done a Miracle. The present Figure is to correct this Errour, and cause us to know, that there ought to be but one point of sight only, as is A, to the which all the Objects ought to draw, and all the Chambers, if there should be fifty, one above the other, or on the one side and the other; as we see these three here, which draw all to the point of sight A. All the rest is made, as we have said heretofore.


Horizon.
Line

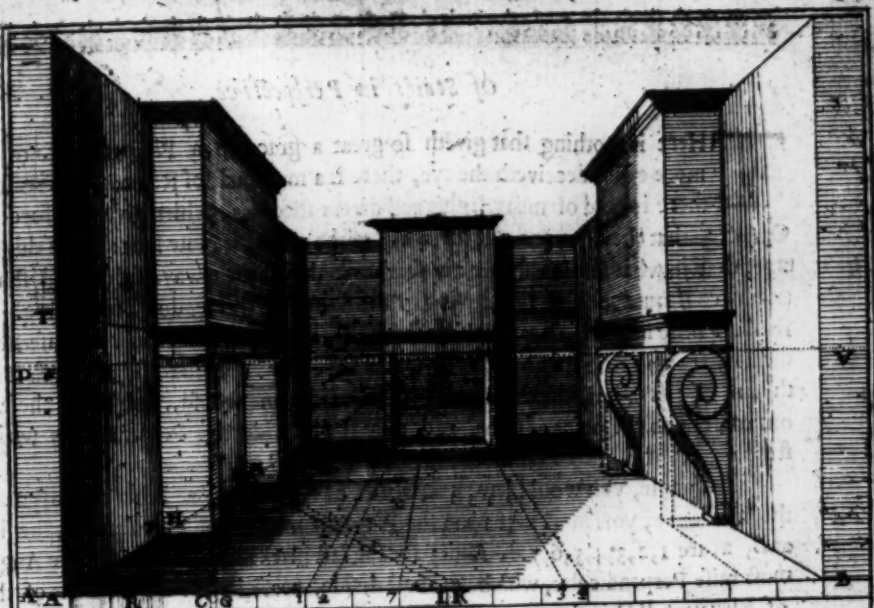
For to ſet Chimneys into Perſpective.

WE muſt take the Meaſures upon the baſe A B, which muſt be divided into equal Parts. You may make the diviſions of what quantity you will. This A B is into eighteen, of each one foot; for to make a Chimney at the Wall A, three feet within the Chamber, we muſt take three Parts, as A C; and draw from the point C to the point of diſtance D, which will give the ſinking of three feet, dividing the Ray A E at the point F, you muſt ſet the thickneſs of the Jaumbs of the Chimney beyond the point C, as is G, then drawing from G to D, it will give this thickneſs at the point H. You muſt alſo ſet the bredth of the Chimney from G unto I, which is of four feet and an half: and for the thickneſs of the ſecond Jaumbs an half foot, as at the other: Beginning at the point I unto K, then to draw from I K to the point of diſtance D, which will give their Meaſure upon the Ray A E, at the points L M, from which four points F H L M, you muſt draw little Parallels to the baſe, as F N H O L P M Q; for to give the bredth to the Jaumbs, you muſt take a foot and half A R, and the Ray R E ſhall divide the little Parallels at the points N O P Q, from which, and from F L, you muſt raiſe Perpendicules; for the height of the Mantle-tree of the Chimney, you muſt take five feet upon the baſe, and carry them to the corner of the wall A unto S, and from S to T for Corniſh, all the reſt is ſeen clearly in the firſt figure.

The other Chimney which is oppoſite to it, is made of the ſame manner, for we ought always to make the Jaumbs as in the firſt; and of theſe Jaumbs, to make Columns, Termes, and all that one would. I have made Brackets to this.

The Chimney of the bottom muſt alſo take its Meaſures upon the baſe 1,2,3,4, drawn to the point of ſight E, for to finde the hollow of the Chimney, or the bredths of the Jaumbs, you muſt draw from 7 to E, and divide the lines of ſinking at the point 5, which ſhall be a foot and half; then from the point of diſtance V, to draw the Diagonal paſſing by 5, which ſhall divide the Ray 2.E. at the point 6, and from this point to draw a Parallel which ſhall divide the four Rays 1,2,3,4. at the points 9,6,9,9, from which you muſt raiſe Perpendiculars, and make all the reſt as in the others.

The ſecond figure ſheweth plainly, and without lines, that which we are ſpeaking of.


A
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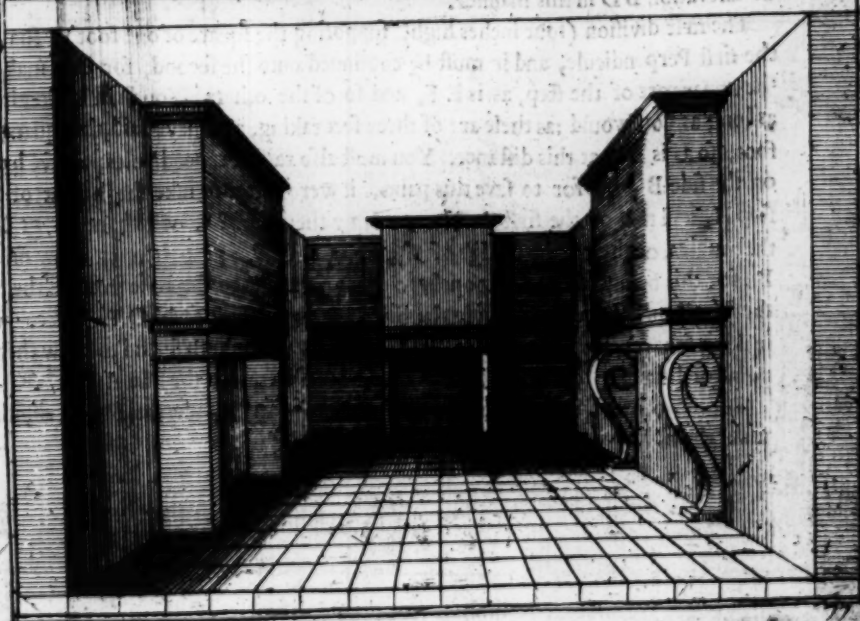
7
I
K
3
4
B
D
V


77

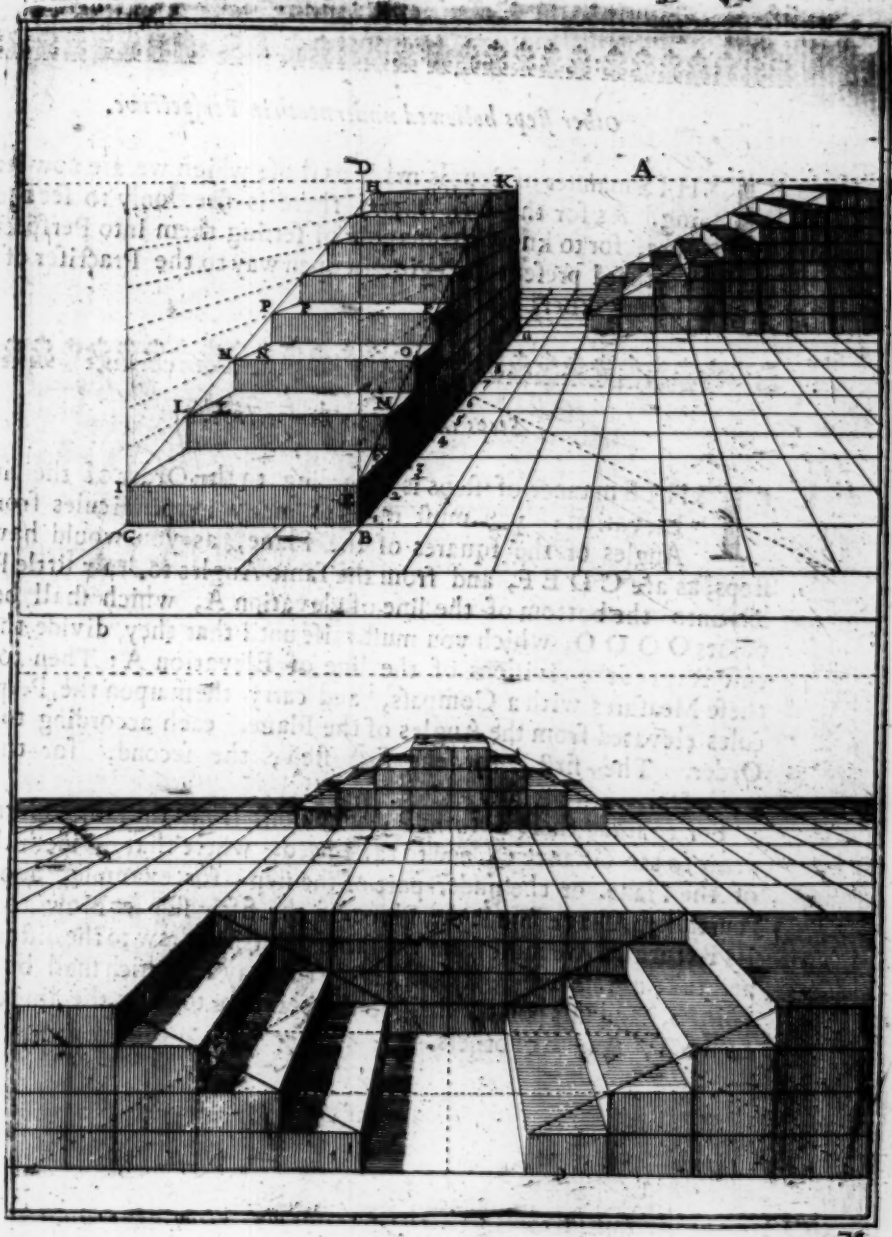
Of Stairs in Perſpective.

THere is nothing that giveth ſo great a grace to a Perſpective, nor which more eaſily deceiveth the eye, there is a multitude of Returns, by reaſon that there is need of many lights and divers ſhadows, which give ſuch force to the Objects, that they ſeem to caſt them out of the work. Now ſtairs have this advantage, that in what faſhion ſoever one ſet them, they have always lights and ſhadows, and by conſequence they are pleaſing to the ſight. I will ſet down ſome here. If one ſhall uſe little ſquares, they will have the more eaſineſs, having only to raiſe Perpendicules, from ſo many ſquares, as he would have ſteps: then to ſet at the firſt ſquare the line of Elevation, divided into as many Parts as one would, and from theſe diviſions to draw to the point of ſight, and they ſhall divide the Perpendicules where the ſteps ought to be.

For example, you would have a ſtair-caſe of eight ſteps, and that the laſt may have the bredth of 3, you muſt take upon the Plane the number of little ſquares, beginning at B, as are 1,2,3,4,5,6,7.8. And 3 for the laſt marked 11, from all theſe Angles we muſt raiſe Perpendicules, which we ſhall divide, according to the diviſions of the line of Elevation B D in this manner.

The firſt diviſion (four inches high, ſuppoſing the ſquare of one foot) ſhall divide the firſt Perpendicule, and it muſt be continued unto the ſecond, for that maketh alſo the upper part of the ſtep, as is E F, and ſo of the others. You ſhall make theſe ſteps as long as you would: as theſe are of three feet taking, as I have ſaid, the ſquare for one foot, ſo as is B G at this diſtance. You muſt alſo raiſe Perpendicules, as we have done on the ſide B; but for to ſave this pains, it were better to take the height of the laſt ſtep H, and that of the firſt I. Then to draw the line H I, which muſt grate upon the Angles, or the outward edge of the Steps, as E K, grateth upon them on the ſide B: for this being, there is but onely to draw parallells to the Baſe from all the Steps on the ſide B, untill that they divide the line H I, as we ſee L M N O P Q, &c. without making ſquares; we need only to ſet the Meaſures upon the Baſe, and to draw them to the point of diſtance. We may have the ſame Meaſures upon the line A B.

I ſet no other figures, ſeeing that this ſufficeth for to Underſtand them all, and for to make them.



73

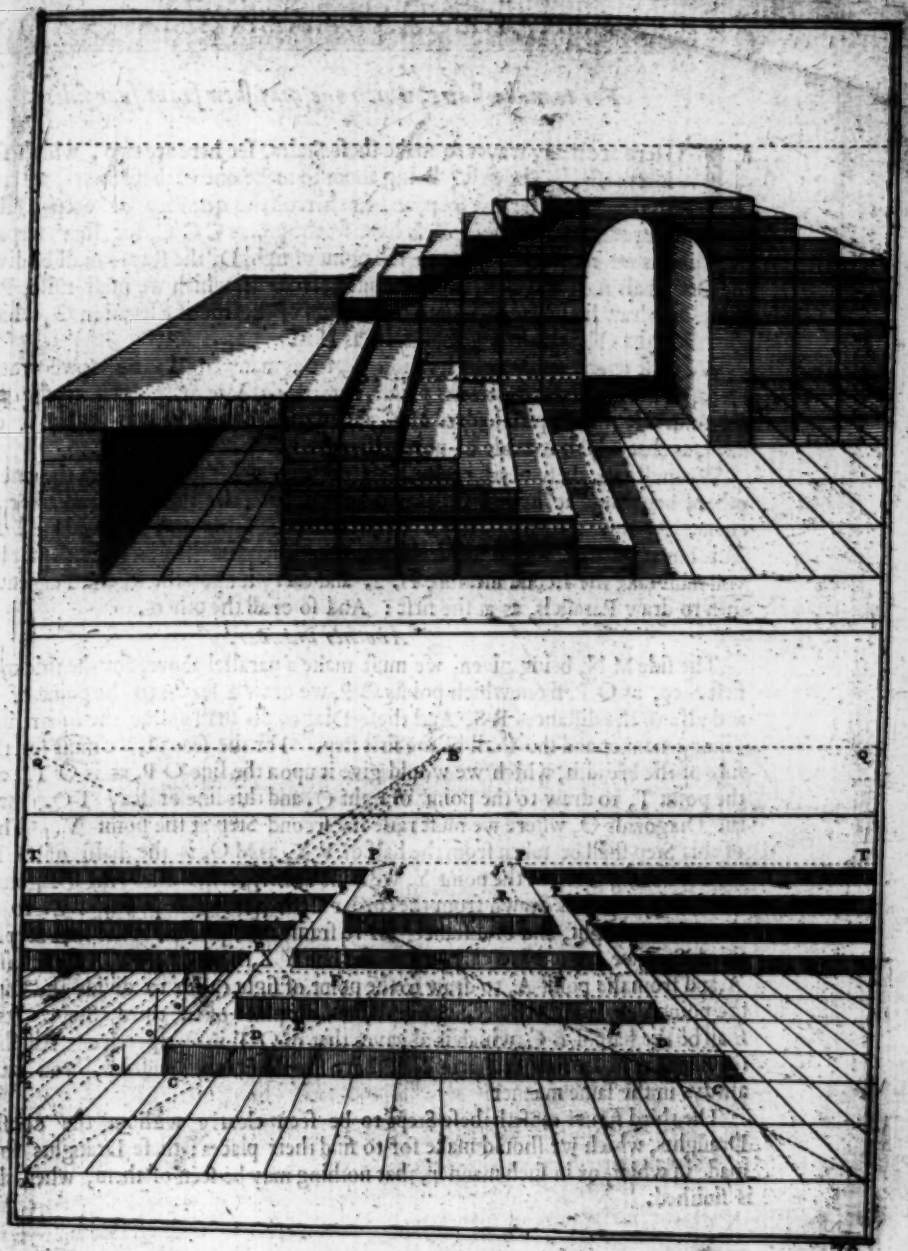
Other steps hollowed nnderneath in Perspective.

THIS manner of steps is made as those which we are now leaveing. As for the hollowness, there is need only to see the Figure, for to know the manner of setting them into Perspective: These two that I present shall give an open way to the Practiser of this Art, to invent others by.

Steps in front in Perspective.

THIS manner of steps is according to the Order of the line of Elevation; you must raise as many Perpendicules from the Angles of the squares of the Plane, as you would have of steps, as are C D E F, and from the same Angles to draw little Parallels unto the bottom of the line of elevation A, which shall be the points O O O O, which you must raise until that they divide the occult Rays of the divisions of the line of Elevation A: Then to take these Measures with a Compass, and carry them upon the Perpendicules elevated from the Angles of the Plane, each according to their Order. The first, for the first step; the second, for the second, &c.

For to finde these Returns P; you must from the same Corners P draw to the distance Q, and to take heed, where that divideth the line of the Plane, or the under-part of the step; for example, above the fourth step I have made the Plane of the fifth step; Now to have its Return P, we must from the same points P, draw to the distance Q, and take notice where it shall divide the Ray R, which shall be at the point S, and this point S shall be the point for to draw the line of Return S T. And so of others.


Q
B
Q
T
P
P
T
D
E
E
D
C
C

For to make ſtairs, which one may ſhew from four ſides.

THere are many wayes to make theſe Stairs, ſee here are two, which ſeem the moſt eaſie. The firſt; Being about to make one of theſe Stairs, we muſt take the length of the firſt Step, and ſet thereon the quantity of Steps, that you would have, as upon the line A B, I have ſet the points C C C, for four ſteps: From theſe points we muſt make Rays to the point of ſight D, the Rayes ſhall be divided by the Diagonals A F, and B E, at the points I, from the which we muſt raiſe Perpendicules, and draw little parallels unto the bottom of the line of Elevation G, which ſhall give the points H, which they ſhall raiſe as H K.

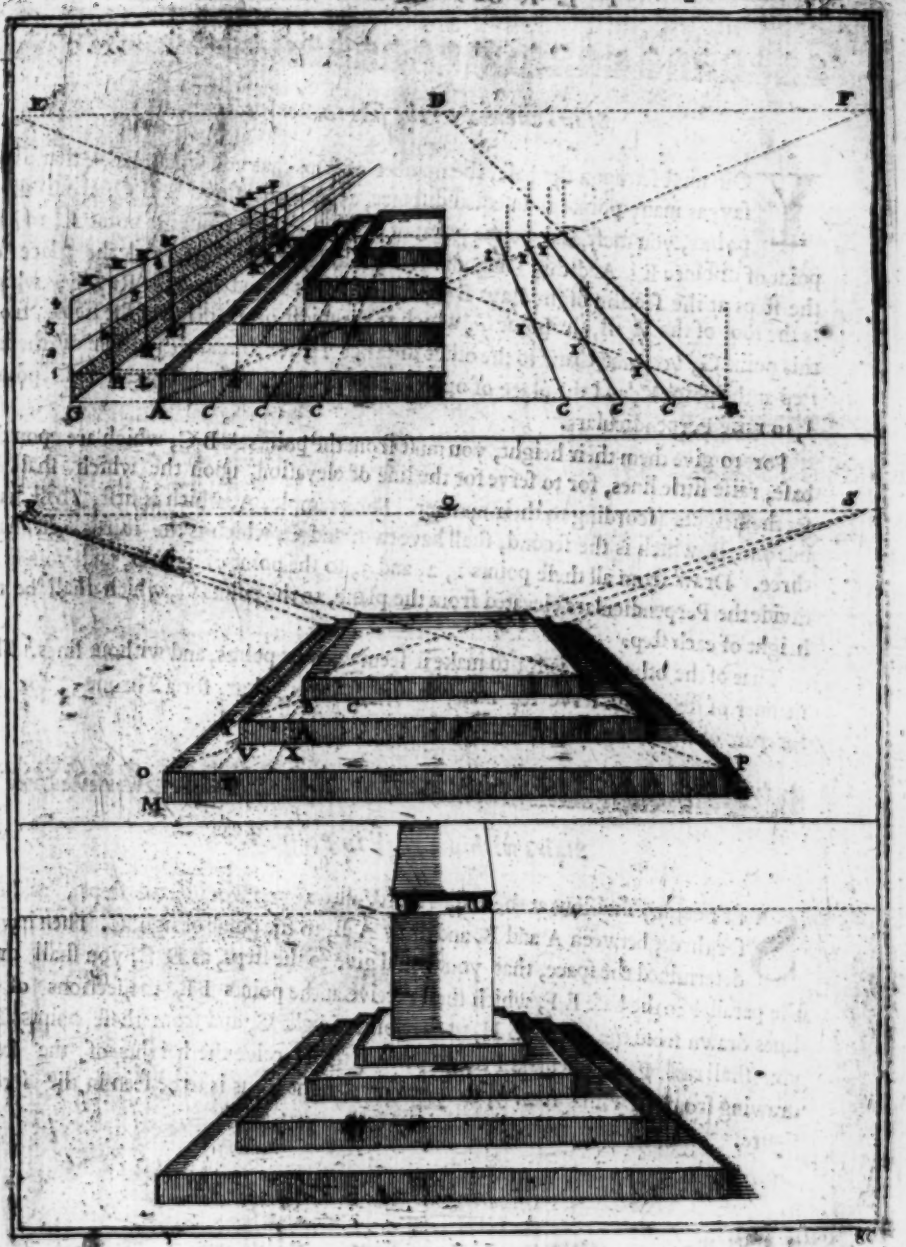
We muſt upon this line of Elevation G, ſet as many equal parts, as we would have Steps, as here 4, from theſe four points 1. 2. 3. 4. We muſt draw to the point D, for to divide the Perpendiculars H K, and to give to each the height that it ought to have, as that which is made of points ſheweth it.

We muſt take theſe meaſures with a Compaſs, and tranſport them the one after the other, beginning at the firſt G, 1. and carry it upon the firſt Perpendicular, to the corner A, as A L, then to draw a parallel unto the other ſide B. (but here I have not ſet it but at the half, for to make the plane to be ſeen in the other) for the ſecond Step, you muſt take the ſecond meaſure H. 2. and carry it upon the ſecond Perpendicular I, then to draw Parallels, as at the firſt: And ſo of all the others.

Another manner.

The ſide M N, being given, we muſt make a parallel above, for the thickneſs of the firſt Step, as O P, from which points O P, we draw 2 Rayes to the point of ſight Q, and alſo to the diſtances R S, And theſe Diagonalls ſhall frame the ſquare in the ordinary manner and this ſhall be the firſt ſtep. For the ſecond, we muſt ſet the meaſure of the breadth, which we would give it upon the line O P, as is O T, and from the point T, to draw to the point of ſight Q. and this line or Ray T Q. ſhall divide the Diagonals O, where we muſt raiſe the ſecond Step at the point V. The height of this Step ſhall be taken from the half of V X, as M O, is the half of O T. This meaſure being given at the point Y, we muſt draw parallels unto the Diagonal of the other ſide, which is drawn from the corner P, then from the points Y Z. to draw to the points of ſight, and of diſtance; for to frame the ſquare as at the firſt Step. For the third Step, we are only to carry upon the line Y Z, the meaſure V X, which ſhall be Y A, and from the point A, to draw to the point of ſight Q, for to divide the Diagonal of the point Y, which ſhall be the point B, and the place of the third Step. Its height ſhall be the half of B C, which is alwayes that of O T in Perſpective. All the reſt is the ſame, as in the firſt and ſecond, if there ſhould be an hundred, you muſt work always in the ſame manner.

The third figure cauſeth theſe Steps to be ſeen clearly without the confuſion of Draughts, which we ſhould make for to find their places: theſe Draughts ſhould be made in white, or in ſuch manner, that nothing may be ſeen of them, when the figure is finiſhed.



Stairs viewed on the ſide in Perſpective.

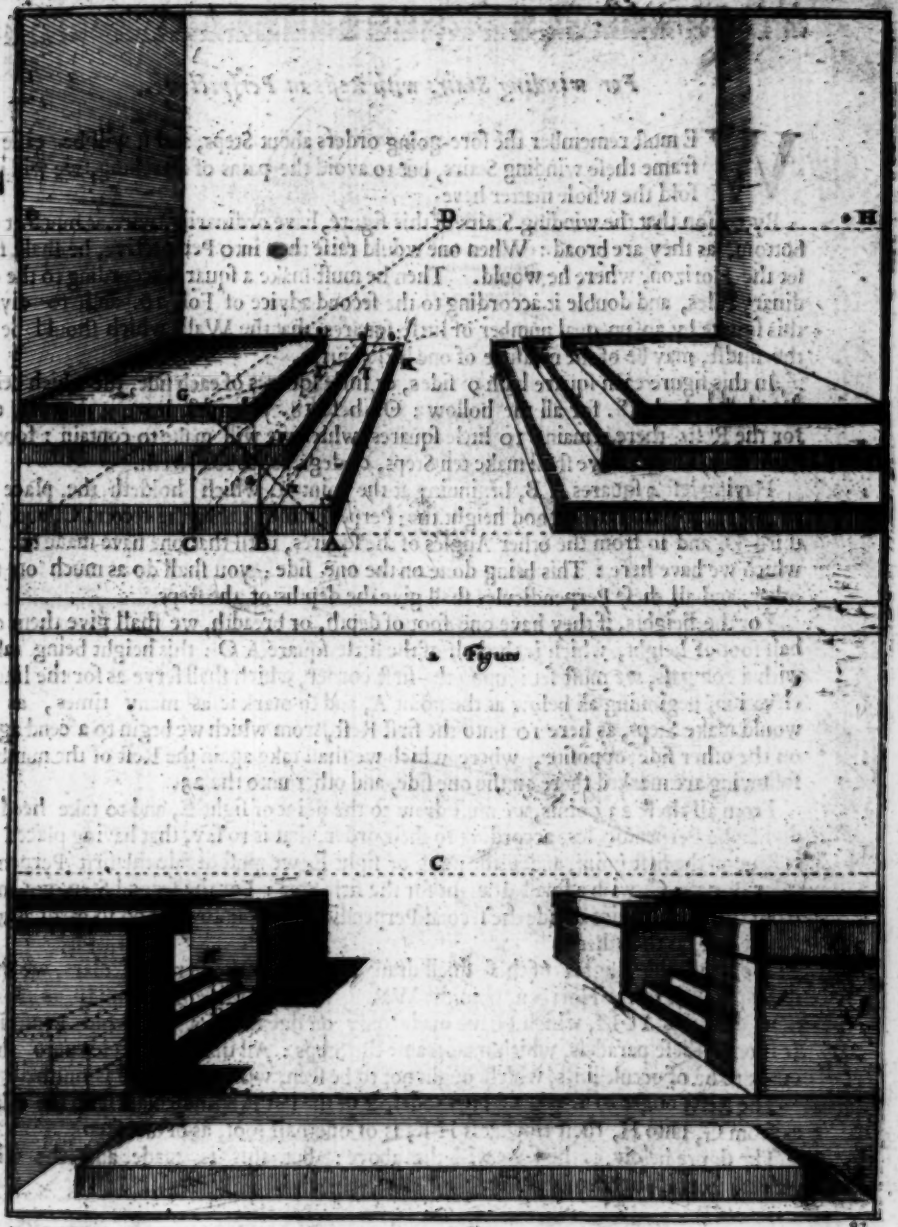
YOu muſt ſet upon the baſe, the number of ſteps that you would have; that is to ſay, as many points at an equal diſtance, as here the three A B C, from theſe points, you muſt draw to the point of ſight D. Then from the point A, to the point of diſtance E; And this Diagonal A E, ſhall give the plane, and the place of the ſteps at the ſection of the Rays B C, at the points I, and upon the Ray F, which is the foot of the Wall, the point G, which is the midſt of the plane of the ſteps, from this point G, you muſt draw to the other diſtance H, for to find the corner of the laſt ſtep at the point K, and the place of others at the points I. Then from all theſe points I, to raiſe Perpendiculars.

For to give them their height, you muſt from the points A B C, which are upon the baſe, raiſe little lines, for to ſerve for the line of elevation, upon the which ſhall be ſet the heights according to their number. For example, A, which is firſt, ſhall have but one, B, which is the ſecond, ſhall have two. and C, which is the third ſhall have three. Draw from all theſe points 1, 2, and 3, to the point of ſight D, and you ſhall divide the Perpendiculars elevated from the plane, to the points O, which ſhall be the height of each ſtep.

That of the other ſide is for to make it ſeem without points, and without lines. This manner of ſteps may ſerve for many things, as for an Altar, for a Throne, for the forepart of a Church, for a Gate, &c.

Stairs within a Wall in Perſpective.

SEt as many diviſions at the end of the Wall, as you would have ſteps, as here, for three, between A and B, and draw A B, to the point of ſight C. Then having determined the ſpace, that you would give to the ſteps, as D E, you ſhall draw the parallel to the baſe E F, which ſhall receive at the points I I, the ſections of the lines drawn from the points G H, to the point of ſight C, and from theſe points I I, you ſhall raiſe Perpendiculars I K, I K, which ſhall receive the heights of the ſteps, drawing from the points 1. 2. 3, to the point of ſight C, as is to be ſeen in the ſecond figure.



2. Figure

For winding Stairs with Reſts in Perſpective.

WE muſt remember the fore-going orders about Steps, and it will be eaſie to frame theſe winding Stairs, but to avoid the pains of ſearching, we will unfold the whole matter here.

By reaſon that the winding Stairs of this figure, have ordinarily twice as much at the bottom, as they are broad: When one would raiſe them into Perſpective, he ſhall firſt ſet the Horizon, where he would. Then he muſt make a ſquare, according to the ordinary rules, and double it according to the ſecond advice of Fol. 16. and to divide this ſquare by an unequal number of little ſquares, that the Walls which ſhould be in the midſt, may be of the meaſure of one little ſquare.

In this figure each ſquare hath 9 ſides, or little ſquares of each ſide, the which being doubled maketh 18. for all the hollow: Of theſe 18. you muſt leave 4 at each end for the Reſts; there remains 10 little ſquares, which we will make to contain 1 foot every way, of which we ſhall make ten Steps, or degrees, as followeth.

Having left 4 ſquares A B, beginning at the point A, which holdeth the place of the Wall, we will raiſe a good height the Perpendicule B, then the ſecond C, and the third D, and ſo from the other Angles of the ſquares, until that one have made the 10. which we have here: This being done on the one ſide; you ſhall do as much on the other, and all theſe Perpendicules ſhall give the depths of the ſteps.

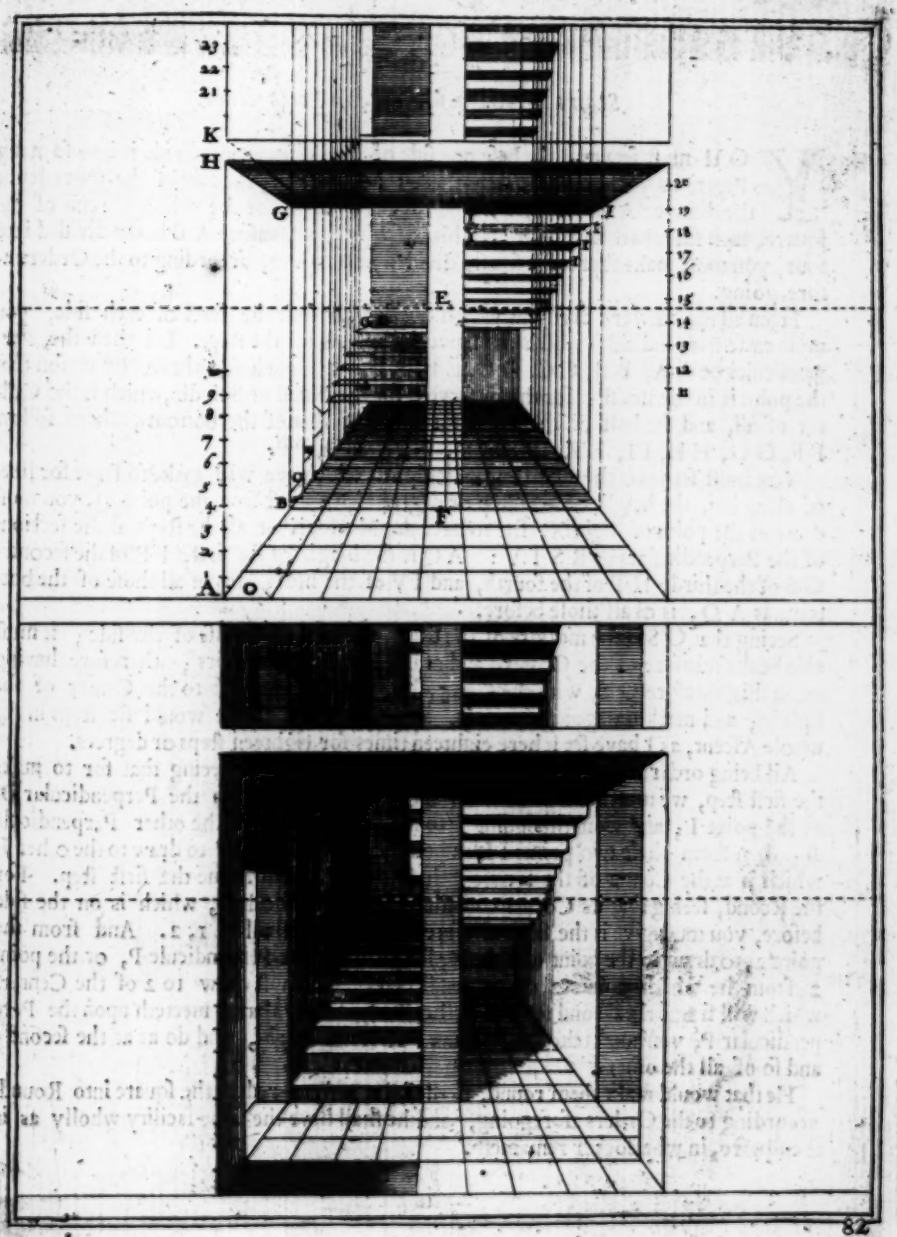
For the heights, if they have one foot of depth, or breadth, we ſhall give them one half foot of height, which is the half of the little ſquare A O: this height being taken with a compaſs, we muſt ſet it upon the firſt corner, which ſhall ſerve as for the line of elevation, beginning all below at the point A, and to mark it as many times, as we would make Steps, as here 10. unto the firſt Reſt, from which we begin to aſcend again on the other ſide oppoſite, where which we ſhall take again the Reſt of the numbers following are marked there on the one ſide, and other unto the 23.

From all theſe 23 points, we muſt draw to the point of ſight E, and to take heed to divide the Perpendicules, according to their order, that is to ſay, that having placed the rule upon the firſt point, and at the point of ſight E; we muſt divide the firſt Perpendicular B, unto C, with a ſmall draught for the firſt Step: For the ſecond Step, we muſt from the ſecond point divide the ſecond Perpendicular C; unto D And ſo of all as well of one ſide, as the other

From all the Angles of theſe ſmall draughts between the Perpendiculars, we muſt draw parallels to the Horizon, unto the Wall F, which is raiſed in the midſt, as are the ſmall draughts IIII, which I have made only on one ſide, for to avoid confuſion. It is only theſe parallels, which muſt frame the Steps: All that is, made unto that, ought to be of occult lines, which ought not to be ſeen, when the figure is finiſhed.

The Reſts ought to be taken from the defect of the laſt Perpendiculars unto the Wall, as from G, unto H, their thickneſs H K, is of one half foot, as of one Step.

The figure below, is the ſame with that above: but this is made, and the other ſheweth how it ought to be made.


K
H
G
I
E
F
A
O
82

Stairs winding upright, in Perſpective.

YOU muſt ſet upon the baſe one ſide of the Aſcent, and divide it into ſo many Parts, as you would ſet ſteps there: for example, the ſide of the ſtairs let be the diſtance A B, if you would have 16 ſteps for the whole Circuit of the ſquare, each ſide ſhall have four: This is, why this Meaſure A B being divided into four, you muſt make thereof a ſquare divided into ſixteen, according to the Orders afore-going.

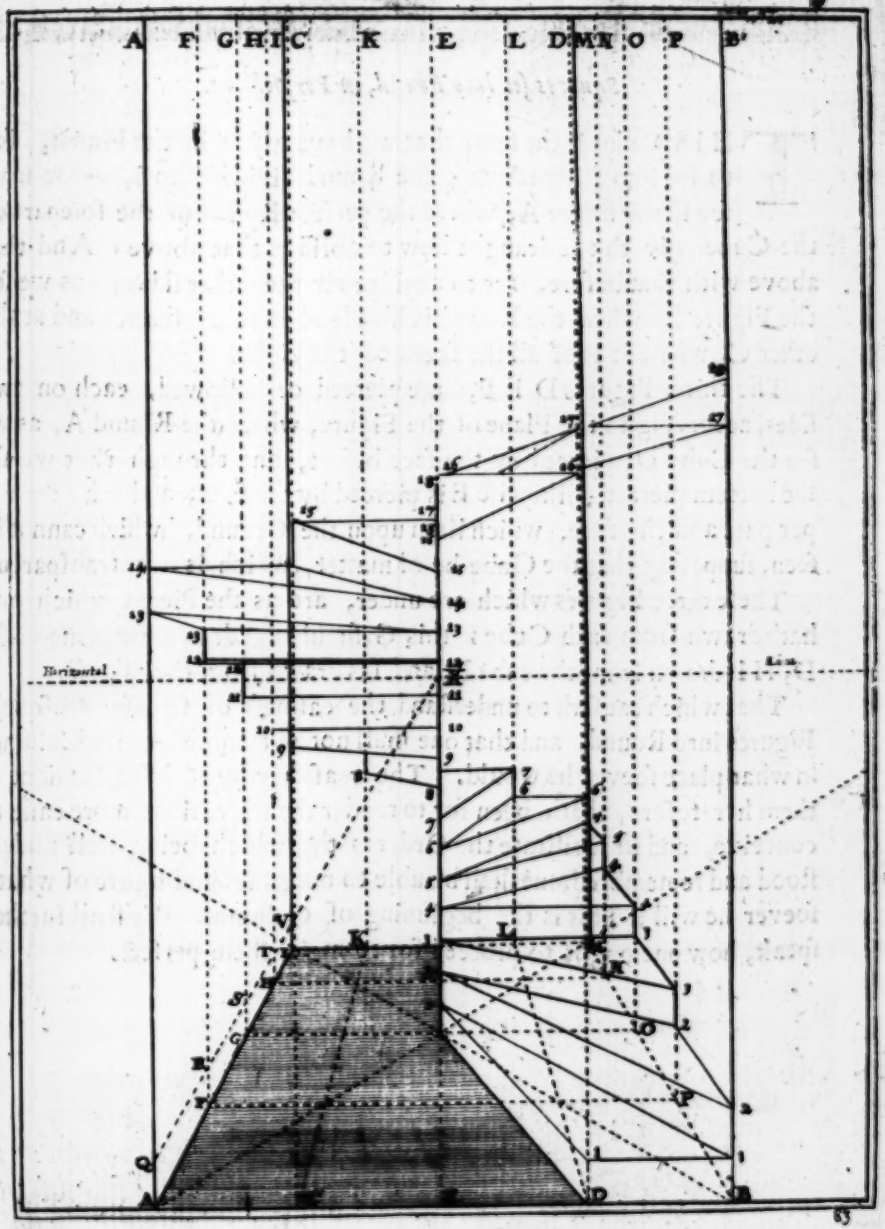
From all the outward diviſions which divide into four the lines of each ſide, you muſt raiſe Perpendicules which will give the bounds of the ſteps. Let then the Perpendicules be A A, B B, C C, D D, E E. This E E made for three, by reaſon that the point is in the midſt; for that it ſerveth for the Nuell or Spindle, which is the Center of all, and the half of the line before, and of that of the bottom, there follow F F, G G, H H, I I, K K, L L, M M, N N, O O, P P.

You muſt ſet upon the firſt Perpendicule A. which we will make to ſerve for lines of elevation, the height of one ſtep or degree Q A: And from the point Q, you muſt draw to the point of ſight X, for to have the Meaſures of all the ſteps at the ſections of the Perpendiculars Q R S T V: A Q is the height of the firſt, F R of the ſecond, G S of the third, H T of the fourth, and I V of the fifth; this of all thoſe of the bottom, as A Q, is of all thoſe before.

Seeing that G S is the meaſure of the third, which is the midſt of the ſide; it muſt alſo be the meaſure of the Center, and of the Nuell of the ſtairs; therefore having taken this Meaſure G S, with the Compaſſes, we muſt carry it to the Center of the ſquare; and mark it in going upwards, as many times as we would ſet ſteps in the whole Aſcent, as I have ſet it here eighteen times for eighteen ſteps or degrees.

All being ordered in this manner, the reſt is eaſie enough, ſeeing that for to make the firſt ſtep, we muſt take the meaſure A Q, and carry it upon the Perpendicular D, to the point I; and from this point I to make a Parallel unto the other Perpendicule B; then from theſe two points I I, upon the Perpendiculars to draw to the other I, which is at the Center of the ſquare; theſe three I I I will frame the firſt ſtep. For the ſecond, ſeeing that its Corner cometh to the Perpendicule B, which is on the ſide before, you muſt give it the ſame meaſure A Q, which ſhall be 1, 2. And from the point 2, to draw to the point of ſight X, for to divide the Perpendicule P, or the point 2, from the which points 2, 2, Perpendiculars, you muſt draw to 2 of the Center, which will frame the ſecond ſtep. For the third, ſeeing that it meeteth upon the Perpendicular P, you muſt take the meaſure F R for its height, and do as at the ſecond; and ſo of all the others.

He that would make them round, needeth but only to reduce the ſquare into Round, according to the Orders aforegoing, and he ſhall have the ſame facility wholly as in the ſquare, in whatſoever remaineth.


A F G H I C K E L D M N O P B'
Horizontal

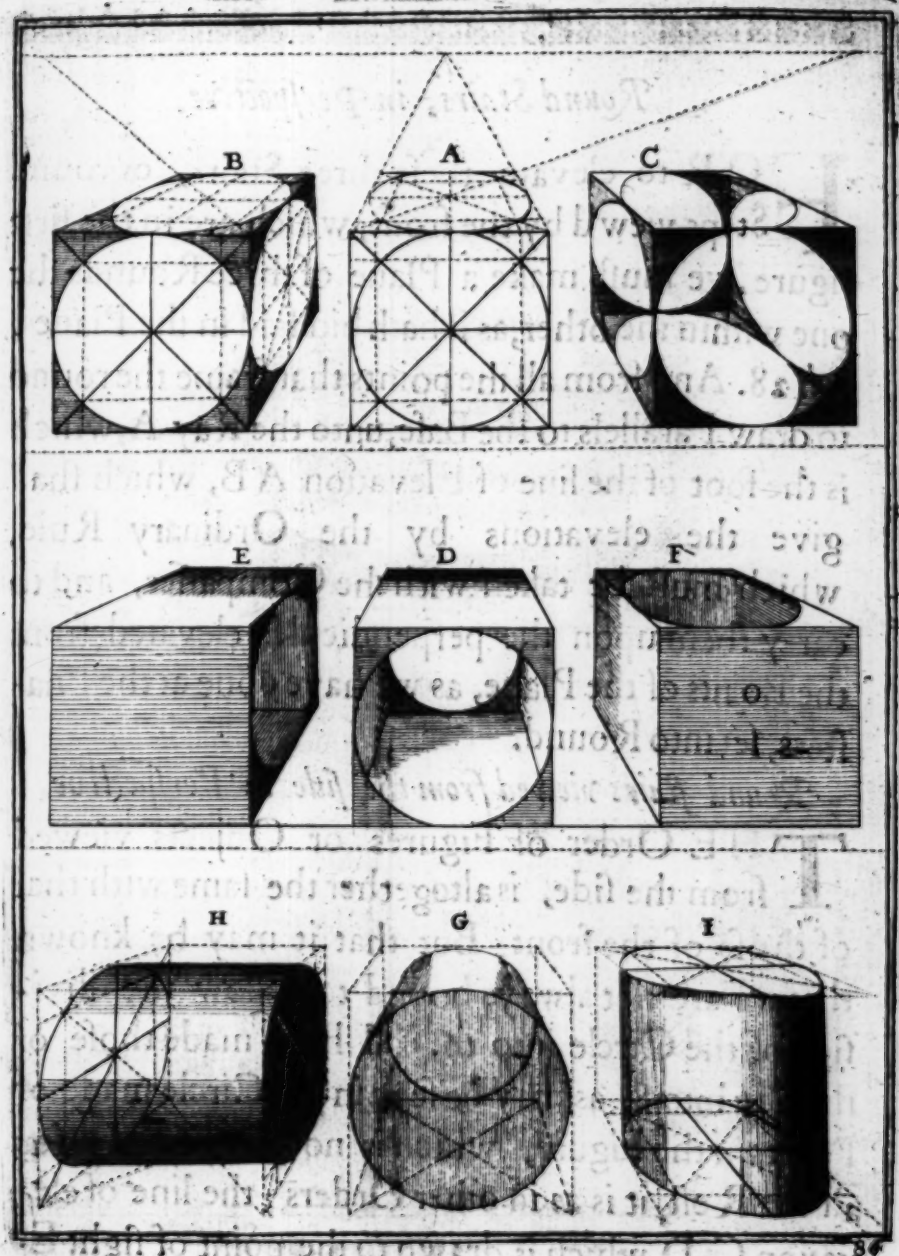
Squares ſet into Round, in Perſpective.

THIS Order is the ſame that we have given in the Planes, for to ſet into Perſpective; the Round divided into 8, as one may ſee in the figure A, where the perfect Round of the forepart of the Cube, giveth the draught how to abridge that above; And that above with that before, for to abridge all the other ſides; as we ſee the Figure B, where the Round is abridged on three ſides, and at the other C, where it is of all the faces of the Cube.

The third Figures D E F, are pierced or hollowed, each on two ſides, according to the Plane of the Figure, where the Round A, as we ſee the Cube D, pierced by the face before, and through that we ſee the bottom pierced; likewiſe E is pierced by the ſides, and F by the upper part and the face, which lieth upon the Ground, which cannot be ſeen, ſuppoſing that the Cube be of matter, which is not tranſparent.

Theſe three Figures which are under, are as the Pieces which one hath drawn from each Cube; this G ſhould be drawn from the Cube D, H is drawn from the cube E, and I is drawn from the cube F.

That which cauſeth to underſtand the eaſineſs of ſetting all ſquare Figures into Round, and that one ſhall not be troubled to ſet Columns in what place ſoever he would. The reaſon why I have ſet none of them heretofore, hath been for to render the Elevations more eaſie to conceive, and to facilitate the Orders; the which being well underſtood and remembred, one ſhall be able to make a round figure of whatſoever he will; This is the beginning of Columns. We ſhall further ſpeak, how one ought to proceed for to make them perfect.


B
A
C
E
D
F
H
G
I

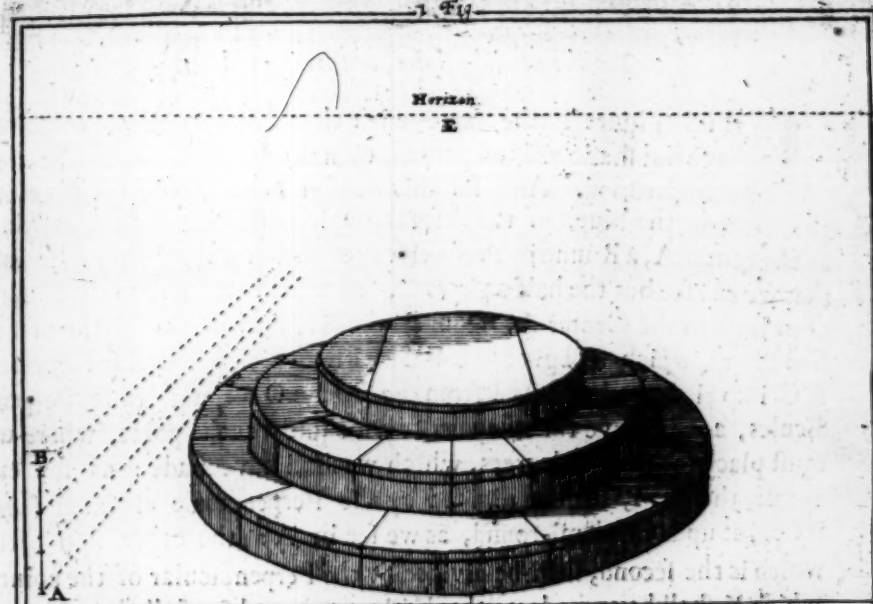
Round Stairs, in Perſpective.

FOR to elevate theſe three Stairs, or round Steps view'd by the front, which are in the firſt figure, we muſt make a Plane of three Rounds the one within the other, as it hath bin ſaid in the Planes, *fol.* 28. And from all the points that frame the round to draw Parallels to the Baſe, unto the Ray A, which is the foot of the line of Elevation A B, which ſhall give the elevations by the Ordinary Rule, which muſt be taken with the Compaſſes, and to carry them upon the perpendicules elevated from the Points of the Plane, as we have done at the Pilaſters, ſet into Round.

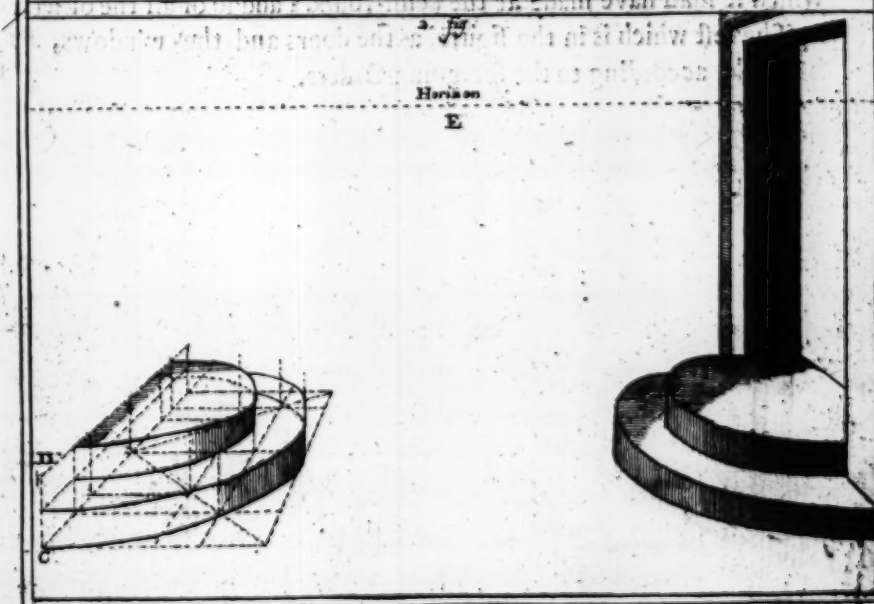
Round ſtairs viewed from the ſide in Perſpective.

THE Order of Figures or Objects viewed from the ſide, is altogether the ſame with that of thoſe of the front; But that it may be known that we are not always bound to follow the diviſion of the Circle into *16.* I have made thoſe of the ſide into 8, as may be ſeen in the Circle made of Points in the Figure, which is not ſhadowed; for all the Reſt, it is as in other Orders; the line of elevation C D, which is drawn to the point of ſight E.

1 Fig



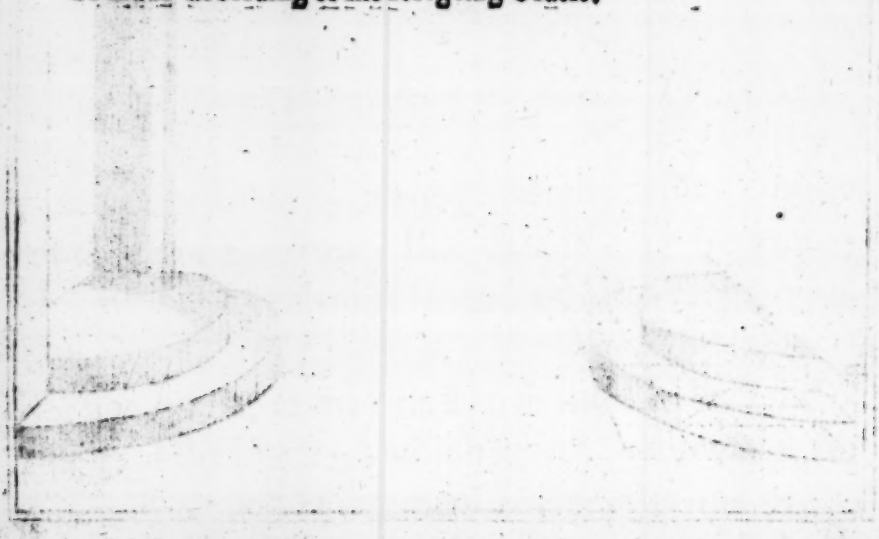
2. fig

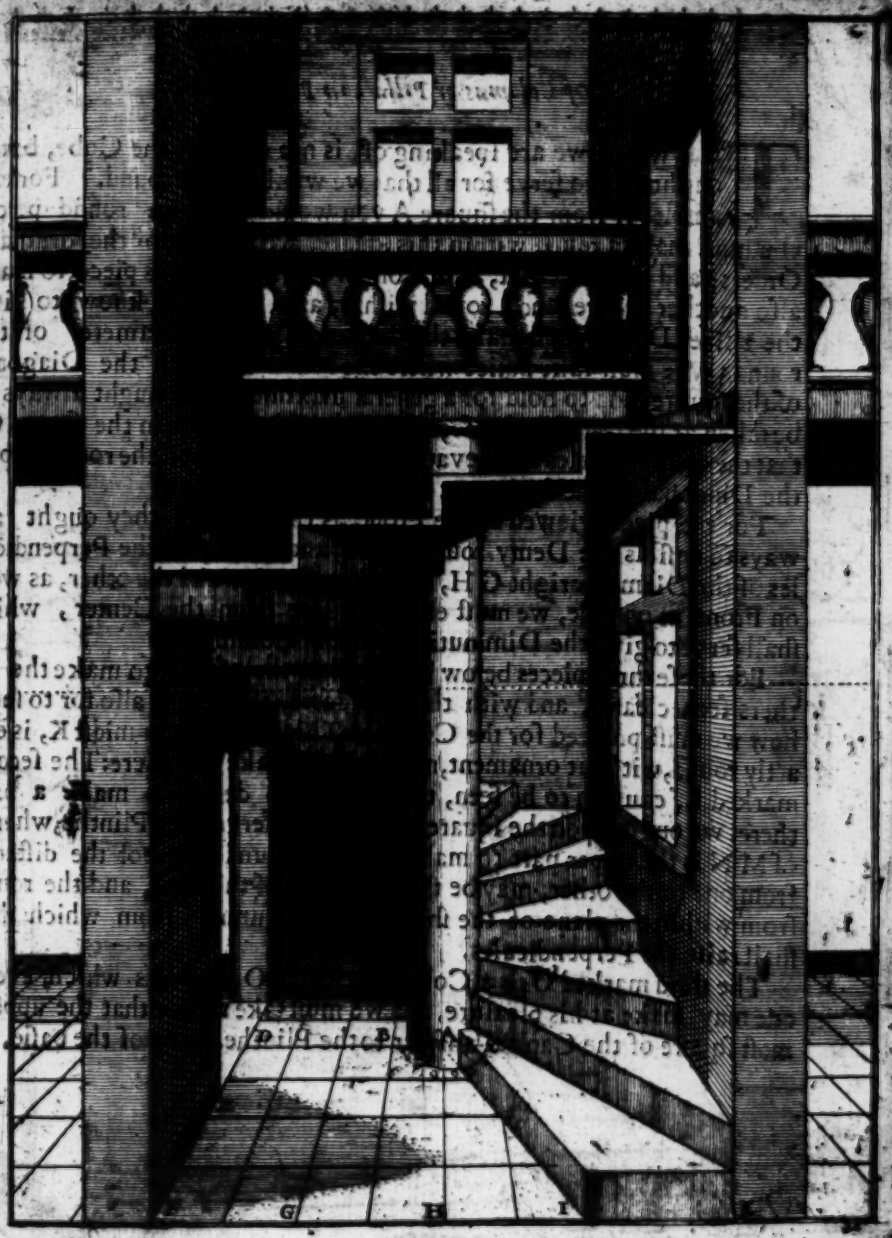


For the winding ſtairs, or turning Aſcent.

THIS Figure is the ſame with that before-going, which I have not ſhadowed, on purpoſe to make the Order to be the better underſtood. And for this reaſon *I* have reſerved for this, the Tree, or the Nuell of the Aſcent, which one may finde by making at the center A, a Round in Perſpective, or rather a demi-round, ſeeing that we can ſee but the half as is B C, at which demi-circle we muſt draw lines to the Center A, from all the diviſions of the ſquare of the firſt Plane, which will give G E F G H I K, which will divide this Arch B C into eight parts. And from the ſection O we muſt raiſe Perpendicules, and obſerve that they ſhall divide juſtly at the point, where we muſt place the ſteps or degrees, which we ſhall have made: as for example, the ſtep I, ſhall be divided by the Perpendicule elevated from its point upon the demi-round, as we ſee in A: the other ſtep after which is the ſecond, ſhall be divided by the Perpendicular of the point, which K ſhall have made at the demi-round; and ſo of all the others.

The reſt which is in the figure, as the doors and the windows, ſhall be made according to the foregoing Orders.




G
H
I

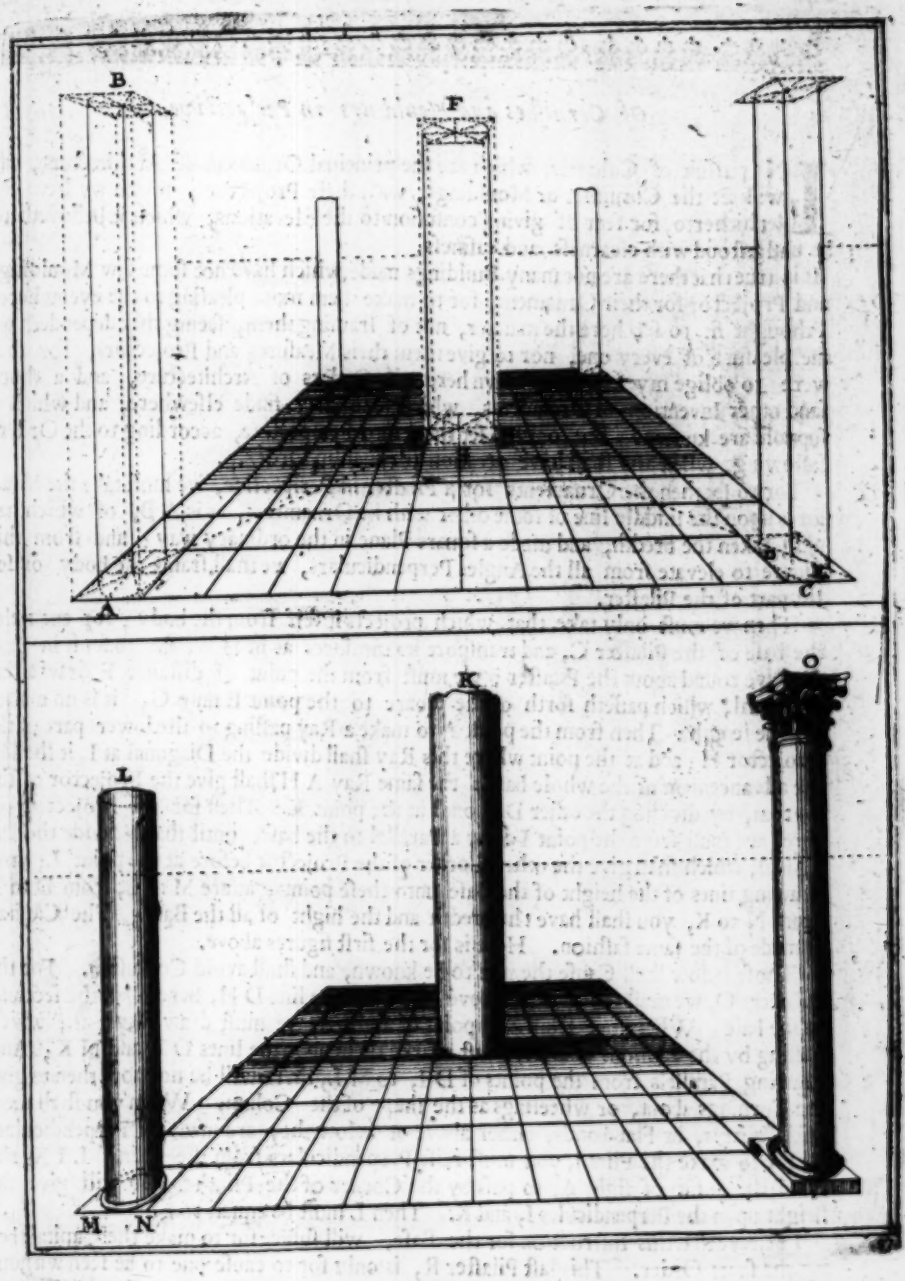
Of Columns or Pillars in Perſpective.

THat which we are ſpeaking of, is not only for the Cube, but it ought alſo to ſerve for all that we would make round. For example, if from the ſquare A you would elevate a round peice, you muſt make a round within this ſquare, according to the ordinary Orders; and at the height, which one would give to this piece, to make alſo another ſquare, and a round within, as is B. For to know to give the 2 lines D E, which make the thickneſs, or the Diameter of the round: We muſt take notice where the round divideth the Diagonal of the ſquare, and to hold for a general maxime, that it ought always to be taken at the round pieces ſeen from the ſide, as it is in the figure C, that the Perpendicules are elevated from the ſection of the round, upon the Diagonal of the ſquare, at the points D E.

For the pieces viewed by the Front, as the figure F, they ought always to poſſeſs the Demy-round G H I, and to elevate the Perpendicules of the Diameter right G H, and from the one and the other, as well on Front, as on Side, we muſt elevate a line from the Center, which ſhall ſerve to give the Diminutions to the Columns.

For theſe three pieces below beſides that they ſerve to make the others ſeen clearly, and with their ſhadows, they ſerve alſo for to ſhew how we muſt proceed for the Columns. This piece of the midſt K, is exactly round, without ornament, nor intent to make any there: The ſecond marked L, cauſeth to be ſeen, that when we deſire to make a baſe there, we ought upon the ſquare, which muſt ſerve for a Plinthe, whereof M N is the upper part to make a double round whereof the diſtance from one to the other, may be the Projector of the baſe, and the round from within the plane of the ſhaft of the Column, from which they ſhall raiſe the Perpendicules.

The third marked O, is a Column with its Ornaments which every one may make at his pleaſure, and we muſt take notice that the uppermoſt ſquare of the Capital anſwer to the Plinthe or top of the baſe.


B
F
A
C
K
L
O
M
N

Of Cornishes and Mouldings in Perspective.

IN pursuit of Columns, which are the principal Ornament of Architecture, we will set the Cornishes or Mouldings, with their Projectors, which we have not set hitherto, for fear of giving confusion to the Elevations, which it behoveth to be understood with clearness and easiness.

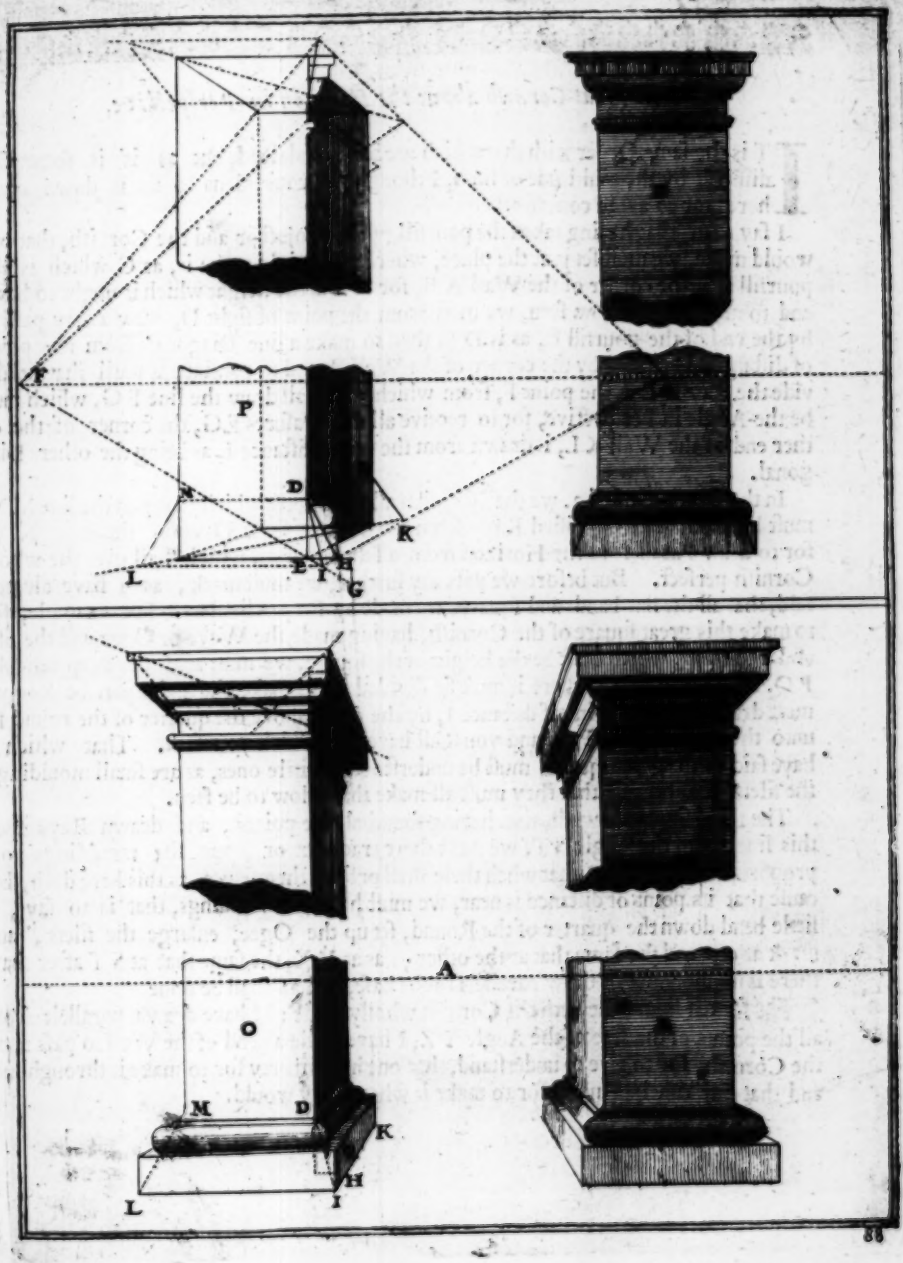
It is true that there are not many Buildings made, which have not some few Mouldings and Projector for their Ornament, for to make them more pleasing to the eye: where-I thought fit to set here the manner, not of framing them, seeing that dependeth on the pleasure of every one, nor to give them their Measures and Projectors, for that were to oblige my self to sit down here, the Orders of Architecture, and a thousand other Inventions of Ornaments, which one may finde elsewhere, and which I suppose are known. But only to set them into Perspective, according to the Orders following, when any shall have occasion for such an Order.

For to set then the Ornaments for a Pilaster in Perspective, we must take the Measures upon the middle line of some other with its Ornaments, as is A B, of which having taken the bredth, and made a square Plane in the ordinary way; and from this square to elevate from all the Angles Perpendiculars, we shall frame the body or solid part of the Pilaster.

Then we must only take that which projects it self from the body; for example, the base of the Pilaster C, and transport its measures as in D E. for to set it in Perspective round about the Pilaster: we must from the point of distance F draw a line Diagonal, which passeth forth of the square to the point E unto G, it is no matter for the length: Then from the point A to make a Ray passing to the lower part of the Projector H; and at the point where this Ray shall divide the Diagonal at I, it shall be the advancement of the whole base: the same Ray A H shall give the Projector of the bottom, by dividing the other Diagonal at the point K: Then for the Projector before, we must from the point I draw a Parallel to the base, until that it divide the Diagonal, which shall give the other Corner of the Projector before at the point L; then drawing lines of the height of the Base unto these points, as are M to L, from D to I, from N to K, you shall have the bredth and the hight of all the Base; The Capitall is made of the same fashion. Here is for the first figures above.

Those below shall Cause the rest to be known, and shall avoid Confusion. For the Pilasters O, we must observe that above P, where the line D H, bereth all the sections of the base; Wherefore from the point of sight A, we must draw Rays, the which passing by the divisions of D H, must marke them upon the lines D I, and N K; And drawing Parallels from the points of D I, to M L, there will be no more then to give the Turnings about, or wheelings as the shape of the Colum. When you shall meet with squares, or Flat-bands, either above or below they are made by Perpendicular. As for to make the Plinth, you must raise Perpendiculars from the Points L I K; the from the point of sight A, to pass by the Corner of the Plinth Q, it will give the height upon the Perpendicules I, and K. Then L must be equall to I.

I beleeve that this Instruction for the Base, will suffice for to make the Capitall being the same Order. This last Pilaster R, is only for to cause one to be seen without being mingled with lines. We have broken them, for to make the Bases and Capitall to be seen, not having had space Enough for to make them appeare whole.


F
P
D
K
L
E
I
H
G
A
O
M
D
K
H
L
I

A great Corniſh above the Horizon in Perſpective.

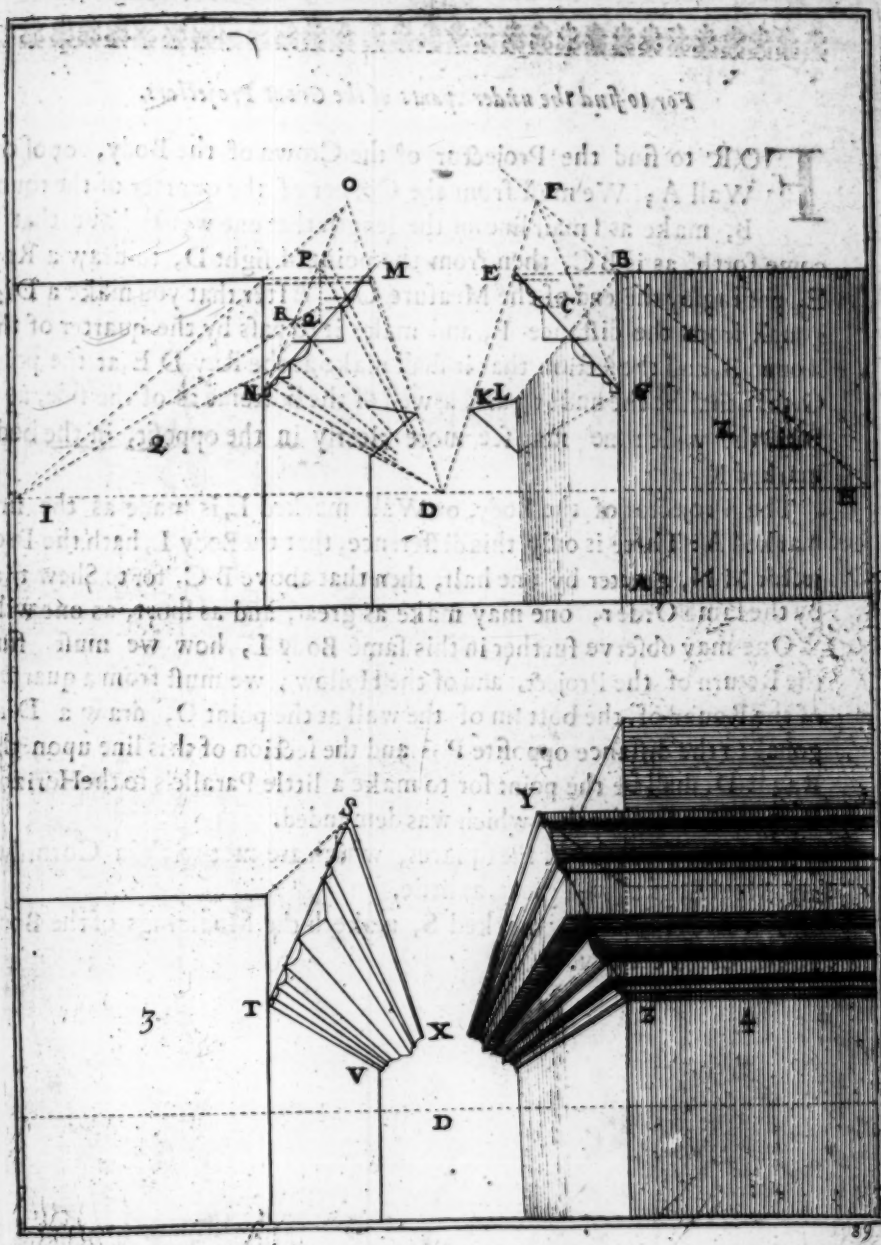
IT is the ſame Order with that which we have explained, but as it is ſomewhat difficult by the multitude of lines, I thought it convenient to ſet it down again here, for to avoid confuſion.

I ſay then, that having taken the pourfill of the Projector and the Corniſh, that one would make, we muſt ſet it at the place, where one would make it, as C which is the pourfill is at the corner of the Wall A B, for to find the height which it ought to have, and to make thoſe below ſeen, we muſt from the point of ſight D, draw a Ray paſſing by the end of the pourfill E, as is D F; then to make a line Diagonal from the point of diſtance H, paſſing by the corner of the Wall B, and to continue it until that it divide the Ray D E at the point F, from which you ſhall draw the line F G, which muſt be the Angle in Perſpective, for to receive all the meaſures E G, the corner of the other end of the Wall K L, is drawn from the other diſtance I, as being the other Diagonal.

In the figure marked 2. we ſhall ſee, that all the figures which are upon the line M N, muſt be tranſported by viſual Rays from the point of ſight D, upon the line N O, for to draw Parallels to the Horizon from all theſe points, which ſhall give the whole Corniſh perfect. But before we paſs any further, we muſt mark, as I have already ſaid, that all the flat-bands and ſquares are made by Perpendiculars. For example, for to make this great ſquare of the Corniſh, having made the Wave or Ogee, and the filet under the filet, which muſt be the height of the ſquare, we muſt abaſe the Perpendicule, P Q. Then for to know where it muſt be divided for to make the under part be ſeen, we muſt draw from the point of diſtance I, by the point above the quarter of the round R, unto the Perpendicule P Q. and you ſhall have that which you ſeek. That which I have ſaid of the great ſquare, muſt be underſtood of little ones, as are ſmall mouldings, the filets, &c becauſe that they muſt all make that below to be ſeen.

The third figure ſheweth, that having found all the points, and drawn Rays upon this line, from the Angle S T, we muſt there trace out or ſhape the mouldings out proportionally: I mean, that when theſe ſhall project themſelves, as this here doth, becauſe that its point of diſtance is near, we muſt help the mouldings, that is to ſay, a little bend down the quarter of the Round, ſet up the Ogee, enlarge the filets, and mark at one end the ſame that at the other; as at V X, the ſame that at S T after that, there is no more but to draw parallels to the baſe, and all ſhall be done

The fourth figure ſheweth the Corniſh wholly made: I have drawn parallels from all the points of the line of the Angle Y Z; I have made an end of the Wall to paſs upon the Corniſh, for to give to underſtand, that one hath liberty for to make it throughout, and that our rule is general for to make it where they would.


O
F
P
M
E
B
R
Q
C
N
K
L
G
Z
2
I
D
H
A
S
Y
T
X
V
3
D
E
4

For to find the under parts of the Great Projectors.

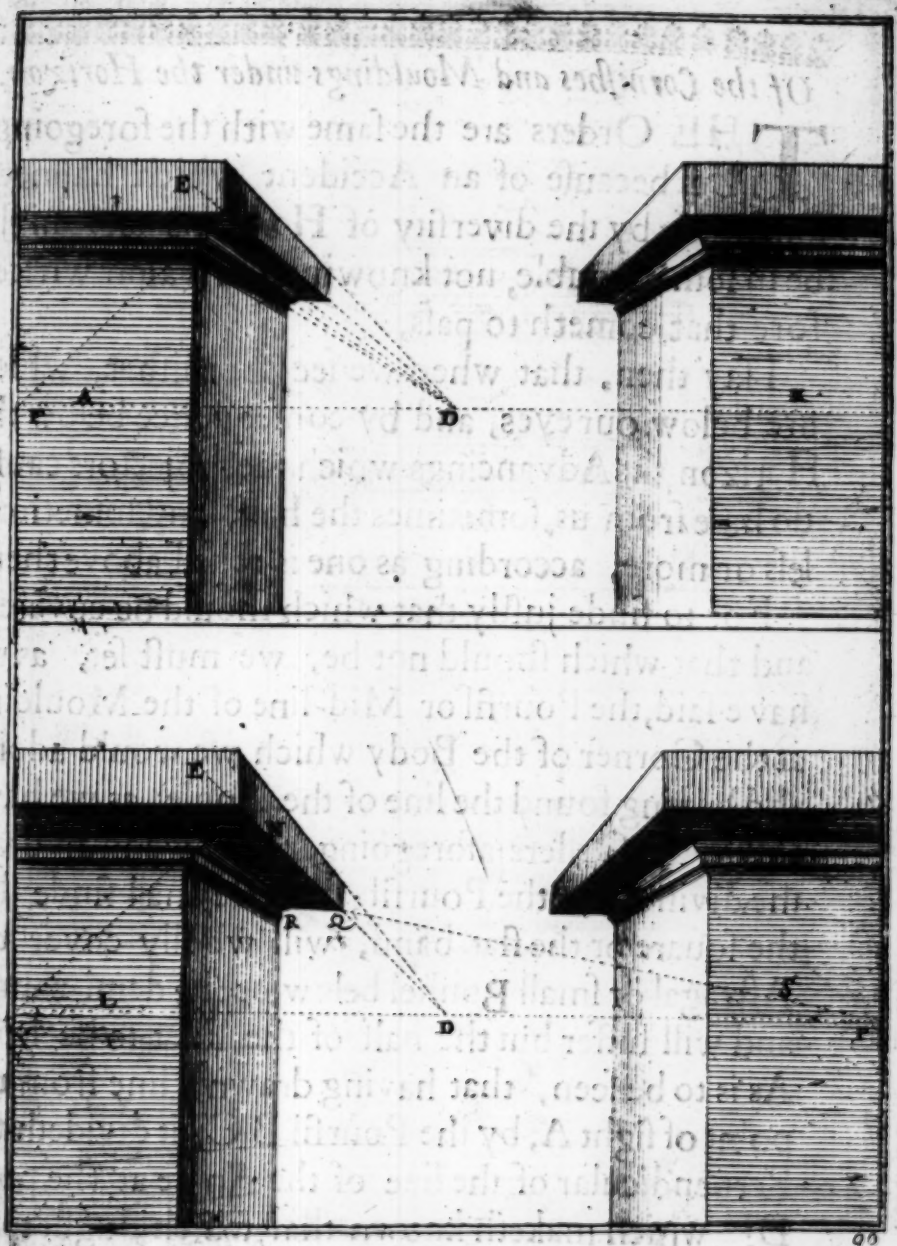
FOR to find the Projector of the Crown of the Body, or of the Wall A; We must from the Corner of the quarter of the round B, make a small line of the length that one would have that it come forth, as is B C, then from the point of sight D, to draw a Ray, E, passing by the end of the Measure C. After that you make a Diagonall from the distance F, and make it to pass by the quarter of the Round B, and the section that it shall make at the Ray D E, at the point G, that shall be the under part, aswell of the bottome as of the side, as is B H, the which one may see more cleerly in the opposit, in the body marked K.

The Projector of the Body, or Wall marked L, is made as the first marked A: There is only this difference, that the Body L, hath the Projector M N, greater by one half, then that above B C, for to Shew that by the same Order, one may make as great, and as short, as one will.

One may observe further in this same Body L, how we must find the Return of the Project, and of the Hollow; we must from a quarter of the Round of the bottom of the wall at the point O, draw a Diagonal to the distance oppofite P; and the section of this line upon the Ray E D, shall be the point for to make a little Parallels to the Horizon R Q, which shall be that which was demanded.

This may serve for all the squares, which are met with in Cornishes and Mouldings as well great, as little.

The Body, or Wall, marked S, maketh the Mouldings of the Body L, to be seen cleerly.


E
A
F
D
E
R
Q
L
D
S
F

Of the Corniſhes and Mouldings under the Horizon.

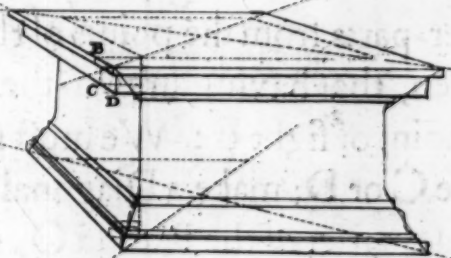
THE Orders are the ſame with the foregoing: But becauſe of an Accident which hapneth ſometimes by the diverſity of Horizons one might be in ſome trouble, not knowing the reaſon wherefore that cometh to paſs,

I ſay then, that when we ſee Corniſhes, which are below our eyes, and by conſequence below the Horizon; the Advancings which the Projectors cauſe, do hide from us, ſometimes the half, and ſometimes leſs or more, according as one is raiſed above them.

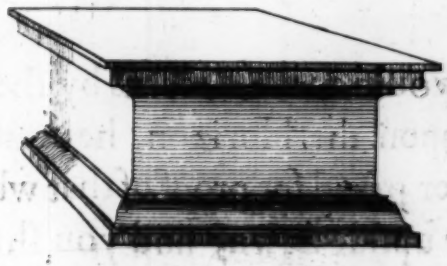
For to finde juſtly that which ſhould be covered, and that which ſhould not be, we muſt ſet, as we have ſaid, the Pourfil or Mid-line of the Moulding at the Corner of the Body which we would adorn, and having found the line of the Angle, as we have ſaid in the Orders aforegoing, there we muſt draw the diviſions of the Pourfil; and we ſhall finde that the ſquare or the flat-band, will wholly cover the Aſtragal or ſmall Boultel below, or the demi-round, and will ſuffer but the half of the Filet to be ſeen; As is to be ſeen, that having drawn a line from the point of ſight A, by the Pourfil B C, it divideth the Perpendicular of the line of the Angle at the point D; which maketh known that which ought to be covered; for the moulding below, it is the ſame thing with the Orders foregoing.

A

1 fig.



2 fig.

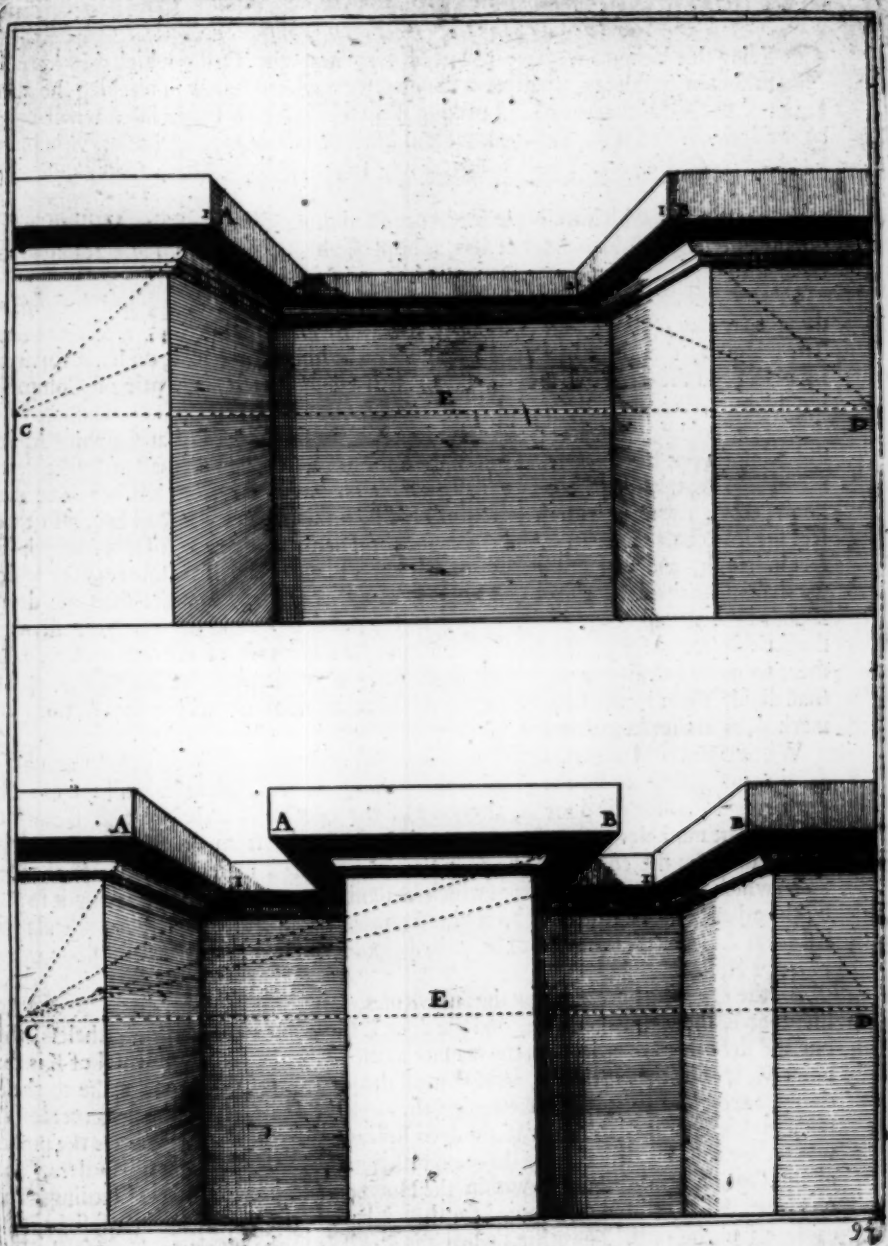


For Corniſhes with many Returns.

WHEN there are many Returns in the Corniſhes or Mouldings, they muſt always take their under-parts from the points of the diſtances, as may be ſeen, that having drawn the Rays A and B, at the point of ſight E: We muſt from the point of diſtance C or D, make a Diagonal paſſing by the corner of a quarter of the Round O, until that it divide the Ray A or B at the point I, from the which point I we muſt make a Parallel to the baſe, for to have the under-part, or the Projector of the ſquare, even as I have ſaid at fol. 98.

I would willingly have made a greater Corniſh, ſeeing that it would not have bin more difficult, but the paper hath obliged me to content my ſelf with this.

If one would make Returns by the Ground, as theſe are upon the Horizon, he muſt obſerve the ſame Order; And for proof of that which I ſay, turn this Paper upſide down, and you ſhall ſee the ſame effects.


A
B
C
D
E
A
B
C
D
E

For the Openings of Doors in Perſpective.

SEeing that hitherto we have followed very near the Order which they keep in raiſing of Buildings, whatſoever they be, we ought to follow in teaching the manner of Garniſhing them, and making them fitting for to lodge in : I will begin by the doors of wood ; afterwards we will ſpeak of other Openings, as of Windows, Cupboards, Cheſts, &c. Then of Moveables, Tables, Beds, Chairs, Coffers, Settles, Benches, &c,

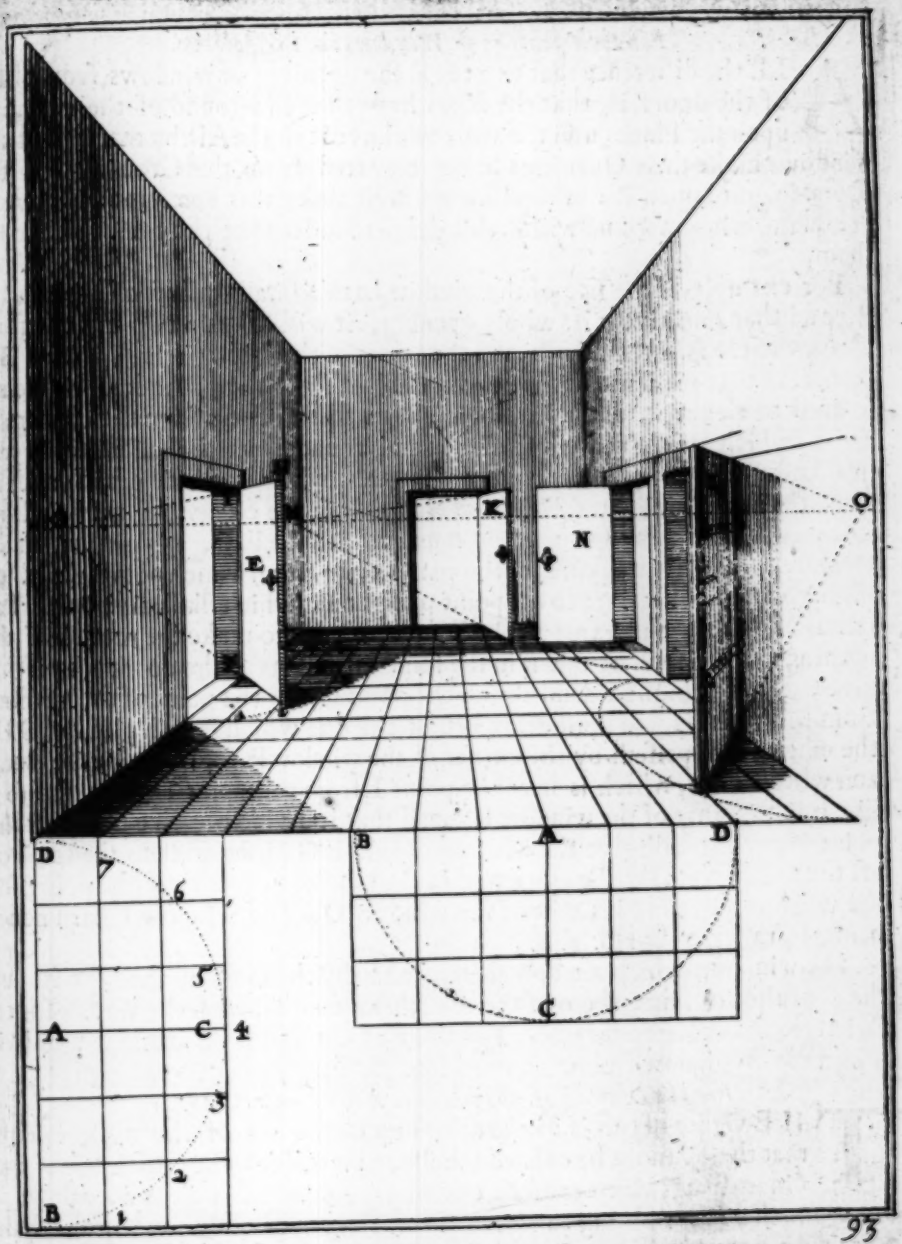
All the doors, which are made for to open and ſhut, depend of the Will of every one, who may open them more or leſs, as he pleaſeth ; wherefore I will teach to ſet them into Perſpective, at ſuch opening as one would have.

We muſt obſerve that the Doors, Windows, Cupboarps, Cheſts, and in ſhort all things that may open and ſhut, do make always a demi-round in their whole opening. The reaſon is, that the ſide which is faſtned by the hinges or hooks, doth not ſtir from its place; and the other ſide moveth and maketh a demi-Circle, as a pair of Compaſſes would do.

For example, in the Plane under the Figure, if the ſide faſtned be at the point A, and the other ſide at B, if you would open the door fully, the ſide B ſhall make the demi-round B C D, whereof the center ſhall be A, as one may ſee : from whence one may know, that if the door hath theee feet of bredth, as theſe have ; it ſhall have alſo three feet for its Diameter A C ; And 6 feet for the Diameter entire B A D, of which ſix feet in length, and 3 of bredth, we muſt make a Plane of 18 little ſquares, for which we ſhall make the demi-round A B C D, for to give a facility to make the ſame demi-rounds in the Perſpective. by obſerving where the demi-round of the Plane divideth the little ſquares, for to divide in the ſame proportion thoſe of the Perſpective, and there to make a demi-round, which ſhall take up as many of the little ſquares, and ſhall divide them in the ſame place, as we ſee at the door E, where the ſections are marked, as in the plane below 1,2,3,4,5,6,7.

When one would make an open door in Perſpective, he muſt upon its Plane make a demi-round ; then to ſet the point of the opening in what place he will, upon this demi-round ; as for the door E, the point of the opening is at the point 2. from this point 2, he muſt elevate a Perpendicular 2.H. And again from the ſame point 2, draw a line paſſing by the corner of the door F, and continue it until that it divide the Horizon which is at the point G, from which he muſt draw another line, making it to paſs by the other corner of the door I, and to continue it till it divide the Perpendicule raiſed from the point 2, which ſhall be at the point H, and you ſhall have the door open, as is F I H,2.

All the Openings are made by the ſame Rules, as are ſeen by the doors K and L ; the door K ſheweth its out-ſide, and the door L ſheweth its inſide ; nevertheleſs, the one and the other are ordered in the manner as the firſt; the point accidental of K is the point M, within the Horizon. And that of the door L is O. If one make to theſe doors, barrs, locks, and ſuch like things, they muſtbe drawn from the ſame accidental point, as the barr and the lock of the door L, draw to the point O. Theſe are the points which they call Accidental, as I have expreſſed in the beginning of our Orders, and all the Openings make but one within the Horizon, except two ſorts of Openings. The one when the door is wholly opened, for then it hath its point at the point of ſight, becauſe it is at the wall. The other, when it is Parallels to the Horizon, becauſe the Parallels never divide themſelves but are drawn right, as is the door N.


K
N
E
O
D
7
6
5
A
C
4
3
2
B
1
B
A
D
C

For the Openings of Windows in Perſpective.

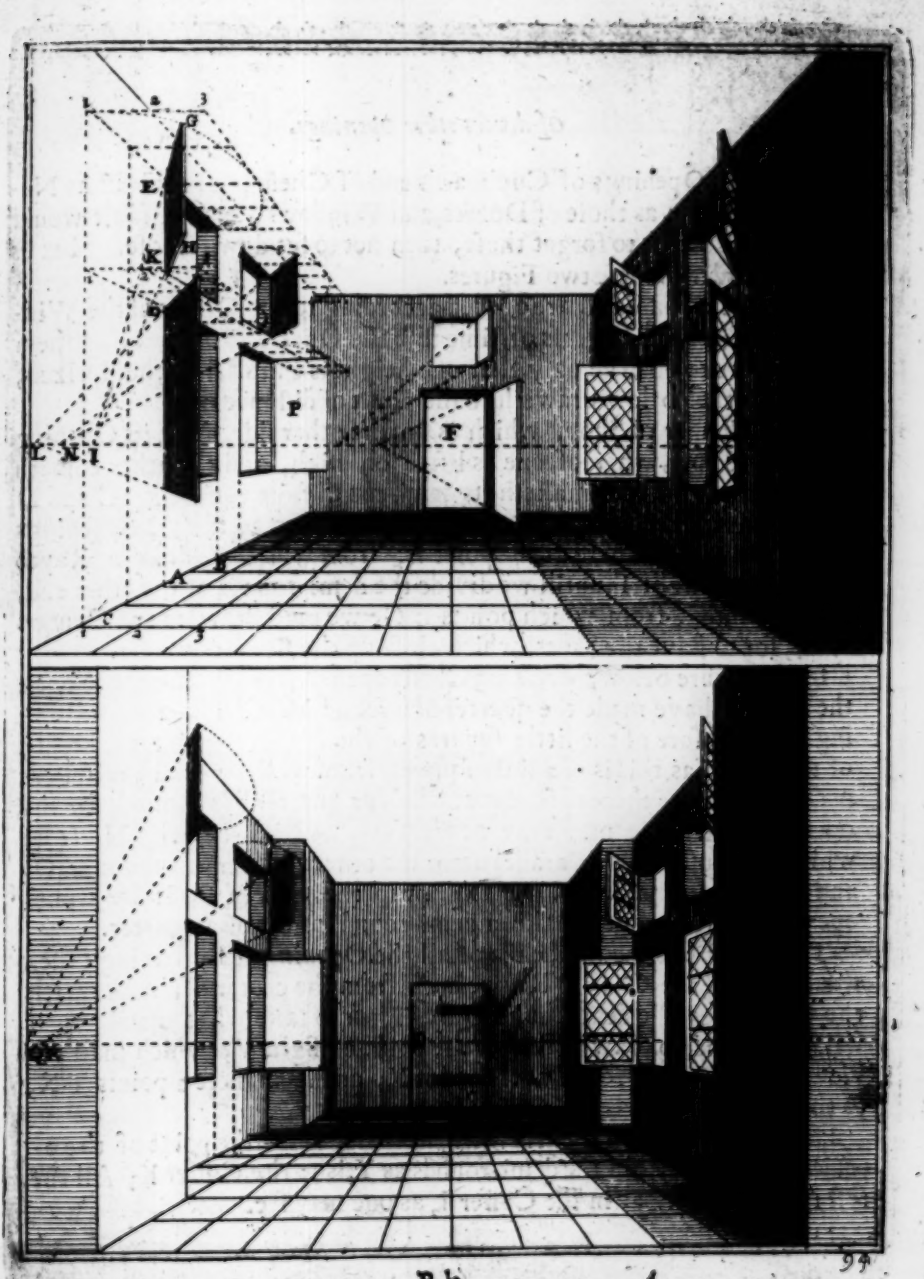
ALL the difference that there is in the openings of windows, from thoſe of the doors, is, that the doors have the demi-round of their opening upon the Plane, and the windows have it in the Air: by reaſon that the windows make their Openings being elevated from the Ground, and the doors do grate upon it: wherefore we muſt make this demi-round above or below the windows; and within this demi-round to take the point for to open them.

For example, if the ſide of the window hath 2 ſmall ſquares of bredth, as A B, and that one give it its whole opening, it will take up two more ſquares C A, whereof A is the middle, and the center of the demi-circle A B C. But by reaſon that the windows are elevated from the Ground, the demi-round alſo muſt be elevated, as they are here above the windows from the corners D and E, which are the centers of theſe demi-rounds, which ſhall be eaſily framed, raiſing Perpendiculars from the ſquares, which are between C and B, until that they divide the Rays, which paſs by the corners of the windows D E. And from theſe ſections you muſt draw to the baſe, and give them the meaſures of the little ſquares of the plane 1,2,3. from which points 1,2,3. on high, you muſt draw lines to the point of ſight F, which ſhall divide the Parallels of points, and frame the little ſquares, for to make the rounds of the openings, which ſhall be taken in the ſame manner as at the doors; as if one give within the higheſt demi-round the point G, for the point of the opening from this point G, you muſt draw 2 lines, the one which falleth plumbe G H, the other which paſſeth by the corner of the window E, for to divide the Horizon where it can, which is here the point I; from this point I you muſt alſo a line by the corner of the window K, until that it divide the line plumb at the point H, which ſhall give the window open K E G H; we muſt do the ſame of all the others, and take the point within the Horizon; as L is the point for the window M; and N is that of the window O. The window P hath none, being Parallel to the Horizon.

The windows which are oppoſite are made by the ſame method, without the confuſion of lines, the one and the other are equal with the wall, for to facilitate the ordering thereof. The door at the bottom is made as we have ſaid, and the window followeth the Method of theſe.

For the Opening of the windows with Chamfrettings.

THE Order of this is as the others upon the ſide of the wall, except that theſe cannot be opened wholly, by reaſon of the thickneſs of the Chamfring; which cauſeth, that the whole demi-circle is not allowed, but as much as the opening can have of it. They ought always to take their point within the Horizon, as we ſee Q and R, for the opening of the windows on high; that below is Parallel to the Horizon.


G
E
K
H
P
F
L
N
I
A
B
C
1
2
3

of divers other Openings.

THE Openings of Cupboards and of Cheſts, are at leaſt as Neceſſary, as thoſe of Doores, and Windows; and the fault would not be leſs to forget theſe, then not to ſet down thoſe. Let us ſee the Order in theſe two Figures.

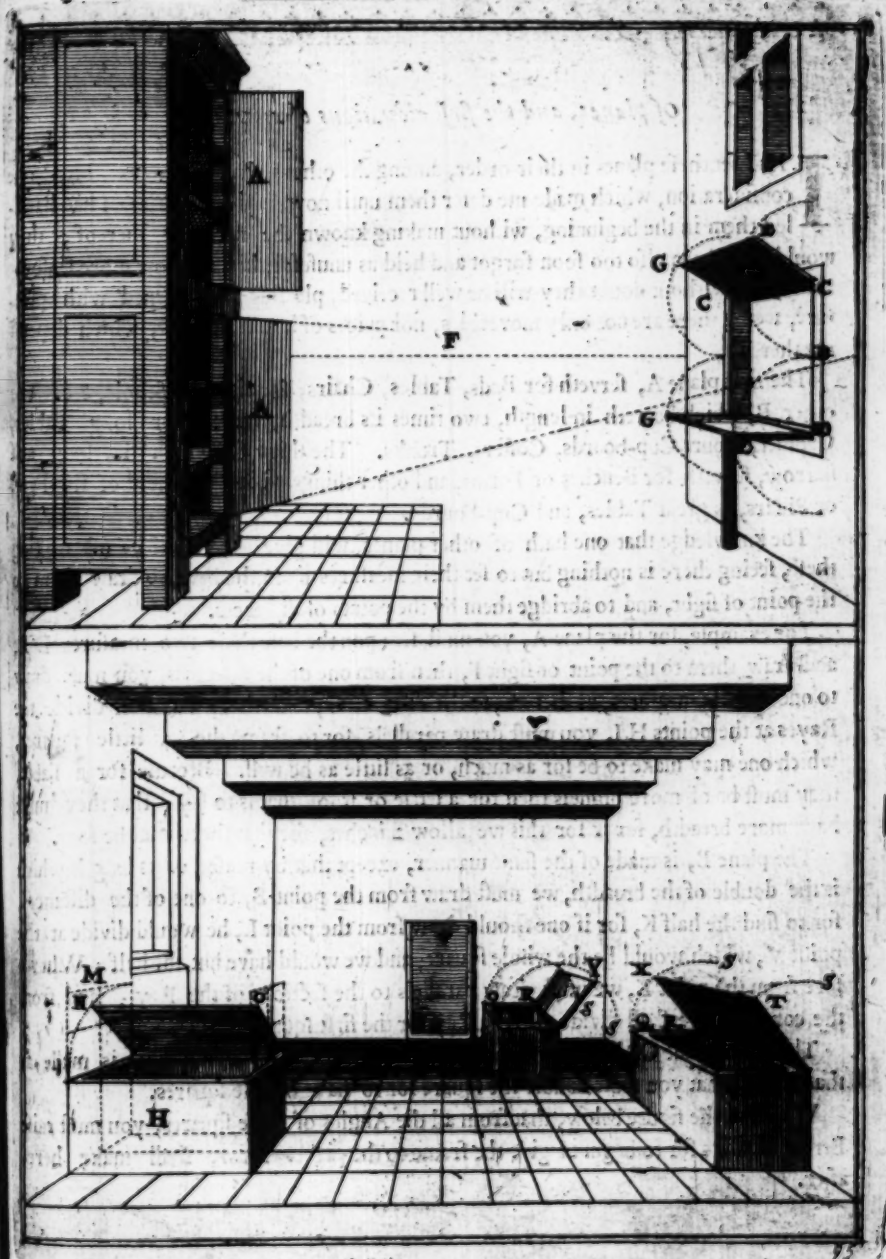
The Cup-boards A, are opened according to the Orders of the Windows, and it would be loſs of time to buſie Ones-ſelf in repeating them here, we are to obſerve only, that one height is Parallel to the Horizon, and the other below draweth to the point of diſtance B.

This Manner of Shop, which is on the other ſide, hath its Opening with two Shuts, whereof one is lifted on high, and the other cometh down below, and each maketh its demi-round from the Center C and D which one maketh with the Compaſſes then we may take the Openings where we will, as here at the point E, from which we draw a Ray to the point of ſight F, untill we divide the demi-rounds of the other end, at the point G, from which points E G, we muſt draw to the Centers C D, for to have the Shuts, which cloſe up the Shop as we ſee.

In the figure below, there are 3 Cheſts opened ſeveral ways for to open the firſt H, I have made the quarter of a round M, in Perſpective, following the Meaſure of the little ſquares of the Plane, keeping the bredth of the Cheſt, as this is of 2 little ſquares, from which we muſt raiſe Perpendiculars, and thereof frame the half or quarter of a Round, for the opening which we may take at pleaſure, as here the point N, from which we muſt draw a Parallel unto the other quarter of the round O, and from theſe 2 points N O, to draw to the Center P, If we would open it wider, we muſt make a demi-round inſtead of a quarter.

The Cheſt I, is the moſt eaſie of all the Openings; for having taken the bredth of the Cheſt Q R, we muſt from the center R, make with the Compaſſes the demi-round Q S. Then to take what opening you will, as T, and to draw a Ray to the point of ſight V, which ſhall divide the other demi-round at the point X, and from theſe 2 points T X, to the corners R.

He that would open them further, hath but to ſet the point of the opening higher, within the demi-rounds as Y, is to the Coffer K; All the reſt is ordered like as in the Coffer I, as one may ſee.


A
A
F
G
C
C
G
M
H
X
T

Of planes, and the first elevations of moveables.

I Had set these planes in their order, among the others, had there not been one consideration, which made me defer them until now, which is, that if I had handled them in the beginning, without making known the necessity thereof, they would have been also too soon forgot and held as unuseful: they are now more seasonable, and without doubt they will be well received, pleasing, and learned with pleasure, seeing there are not only moveables, nor peices of houshold-stuff, which depend not thereon.

The first plane A, serveth for Beds, Tables, Chairs, Stools, low Stools, &c. The other B, which beareth in length, two times its breadth, serveth for long Tables, Cabinet, Court Cup-boards, Coffers, Trunks. The third C, which is long and narrow, serveth for Benches or Forms, and other things which have need of six Feet, or Pillars, as great Tables, and Cup-boards.

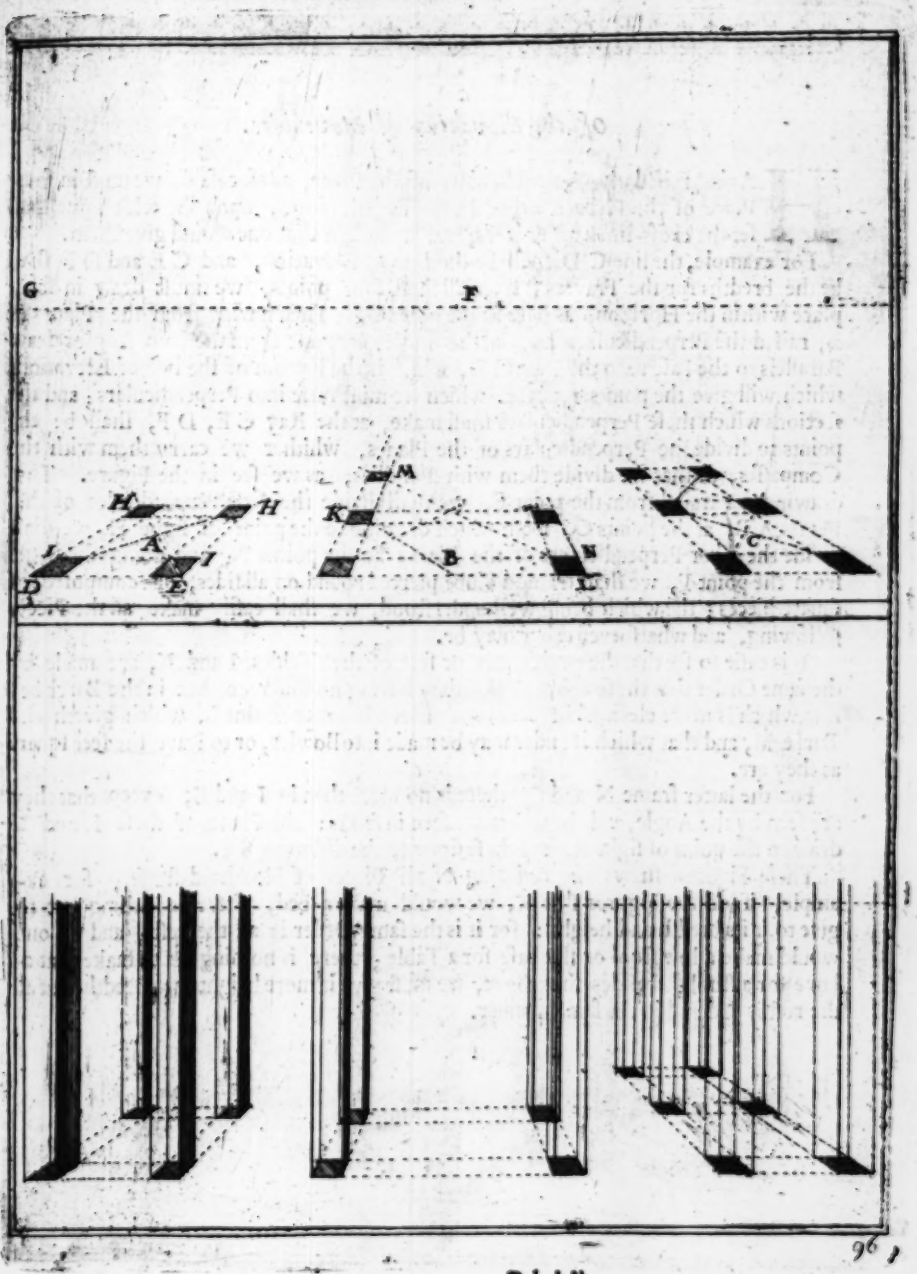
The knowledge that one hath of other planes, will give the facility of making these, seeing there is nothing but to set their measures upon the base, to draw them to the point of sight, and to abridge them by the points of distances.

For example, for the plane A, you must set upon the base these two measures D E, and draw them to the point of sight F, then from one of the distances, you must draw to one of these measures, as here E, to the distance G, and where that shall divide the Rayes at the points H I, you must draw parallels, for to frame the 4 little squares, which one may make to be for as much, or as little as he will. Because for a Table, they must be of more bigness then for a settle or stool, that is to say, that they must have more breadth, for if for this we allow 2 inches, for that there must be four.

The plane B, is made of the same manner, except that by reason of its length, which is the double of the breadth, we must draw from the point B, to one of the distances, for to find the half K, for if one should draw from the point L, he would divide at the point M, which would be the whole square, and we would have but the half: Wherefore from the point K, we must draw parallels to the sections of the Ray; and from the corner L, we shall divide also the Ray for the first squares at the point N.

The other plane C, hath no need of explication, for we see well, that it is made as that A, and that you must double the square for to have 6 little squares.

We see at the figure below, that from all the Angles of these squares, you must raise Perpendiculars for to begin to give the frame to the pieces that we shall make hereafter.


G
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H
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A
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I
D
E
M
K
B
N
L
C

Of the Elevation of Moveables.

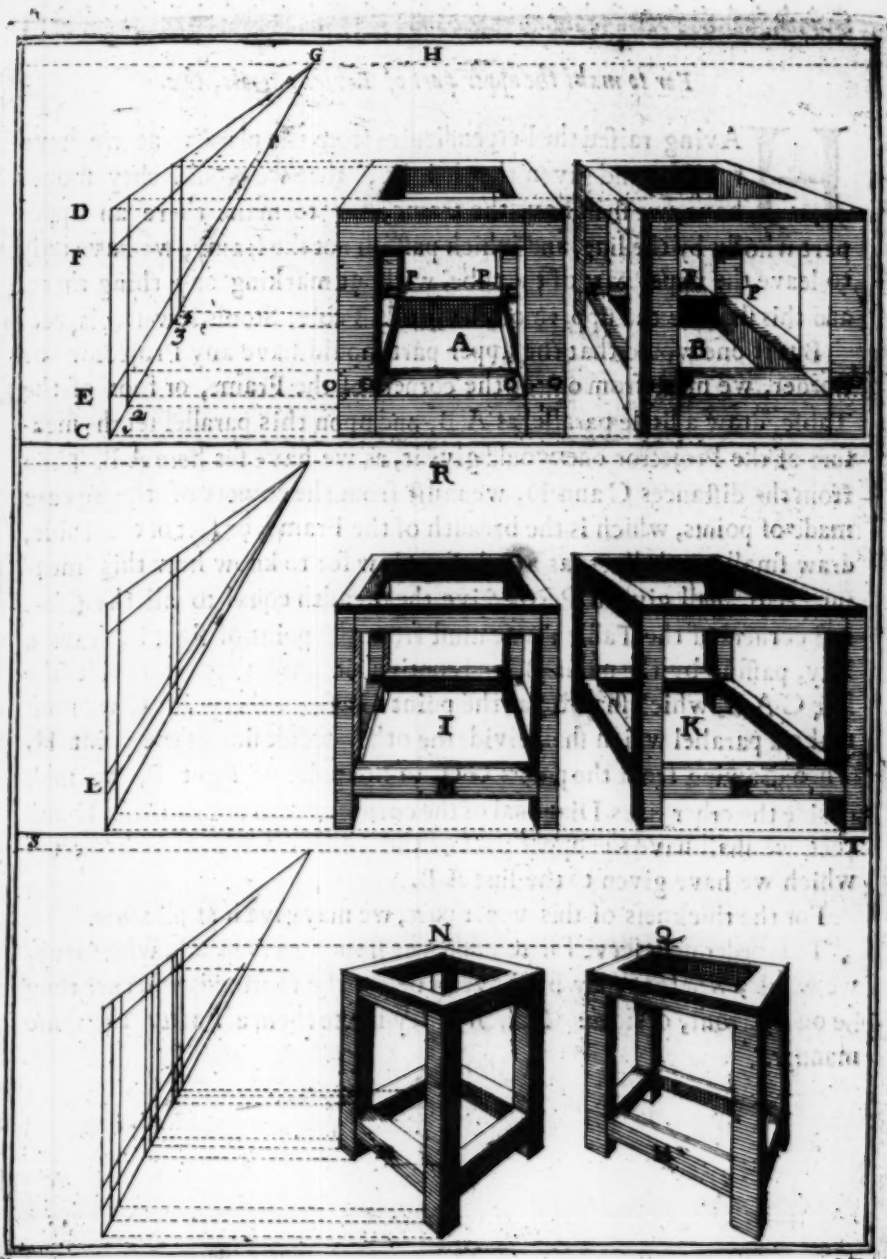
HAving raiſed the Perpendiculars of the Plane, as aforeſaid, we muſt in ſome Place of the Picture make the line of Elevation, upon the which we ſhall ſet the croſs-lines or Travers, and the height that one would give them.

For example, the line C D ſhall be the line of Elevation, and C E and D F ſhall be the bredths for the Travers; from all theſe four points, we muſt draw in ſome place within the Horizon, as here at the point G. Then having from the Planes A B, raiſed the Perpendiculars from all the Angles, we muſt from the ſame Angles draw Parallels to the baſe unto the Ray C G, which is the bottom of the line of Elevation, which will give the points 1,2,3,4. which we muſt raiſe into Perpendiculars; and the ſections which theſe Perpendiculars ſhall make, at the Ray C E, D F, ſhall be the points to divide the Perpendiculars of the Planes, whither we carry them with the Compaſſes, or that we divide them with Parallels, as we ſee in the Figure. That drawing a Parallel from the point E, we ſhall divide the firſt Perpendicules of the Planes A B, at the points O, from which drawing to the point of ſight H, we ſhall divide the other Perpendiculars of the Planes at the points P; and doing the ſame from the point F, we ſhall frame a Cube pierced round on all ſides, or compoſed of ſquare pieces; the which being well underſtood, we ſhall eaſily make all the Pieces following, and whatſoever other may be.

It is eaſie to ſee that the two frames or feet of the Tables I and K, are made by the ſame Order that thoſe above A B, they having no difference but in the Barre below, which is more elevated in the line of Elevation at the point L, which giveth the Barre M, and that which is under may be made into Bowles, or to leave the feet ſquare as they are.

For the latter frame N and Q, there is no more then in I and K, except that they are ſeen by the Angle, and the others are ſeen in front: the Planes of theſe I and K draw to the point of ſight R, and theſe draw to the diſtances S T.

Theſe Figures ſhews the ordering of all Pieces of Houſhold-ſtuffe; for example, if of the Figures I or K, we would make a bed, there is nothing but to give to it its bredth and height: for it is the ſame Order in all the reſt; and if one would make a low ſtool or flat baſe for a Table; there is nothing but to make that above for a ſtool; beſides that above, we muſt give it more height then bredth, but all the reſt is ordered in the ſame manner.


G
H
D
F
E
C
A
B
R
L
I
K
N
O

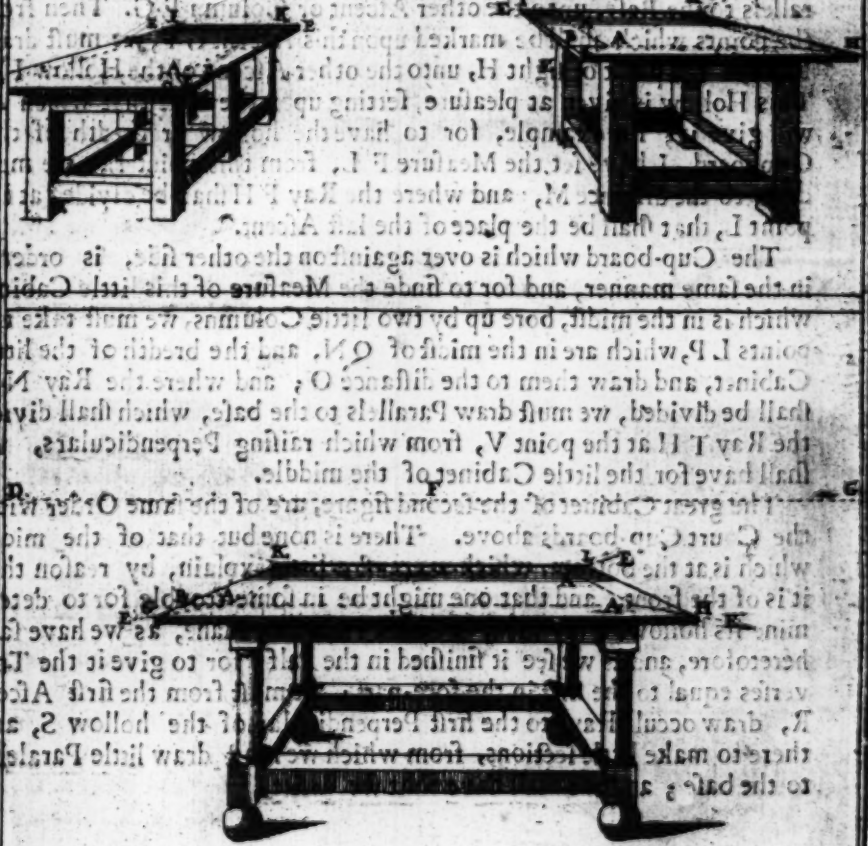
For to make the upper part of Tables, Stools, &c.

HAving raiſed the Perpendicules from the plane, as we have ſpoken, and given the height, that we would they ſhould have, we ſhall have the frame, for to make there an upper part wholly by the line, and which paſſeth not the frame; we have only to leave the upper part of the cube, without marking any thing there, and this ſhall be the uppermoſt, be it of a Table, Stools, low-ſtools, &c.

But if one would that the upper part ſhould have any Projector or Border, we muſt from one of the corners of the Frame, or foot of the Table, draw a little parallel as A B, and upon this parallel ſet th meaſure of the Projector one would give it, as we have ſet here A B. Then from the diſtances C and D, we muſt from the corners of the ſquare made of points, which is the breadth of the Frame, or feet of the Table, draw ſmall occult lines, as are A E. Now for to know how this meaſure A B, ſhall give in Perſpective the breadth equal to all the ſides, and corners of the Table; We muſt from the point of ſight F, draw a Ray, paſſing by the point B, and continue it until that it divide the line C A E, which ſhall be at the point G: from this point G we muſt make a parallel which ſhall divide the other occult line at the point H. Then drawing from the points G H, to the point of ſight F, we ſhall divide the other lines Diagonal of the corners at the points L and K, and then we ſhall have the upper part of the Table, with the Projector which we have given to the line A B.

For the thickneſs of this upper part, we may give it at pleaſure.

This order may ſerve for to make the upper parts in all whatſoever we would, whether they be above or below the Horizon, whether they be on the front, or ſides: In ſhort, they make them all after the ſame manner.

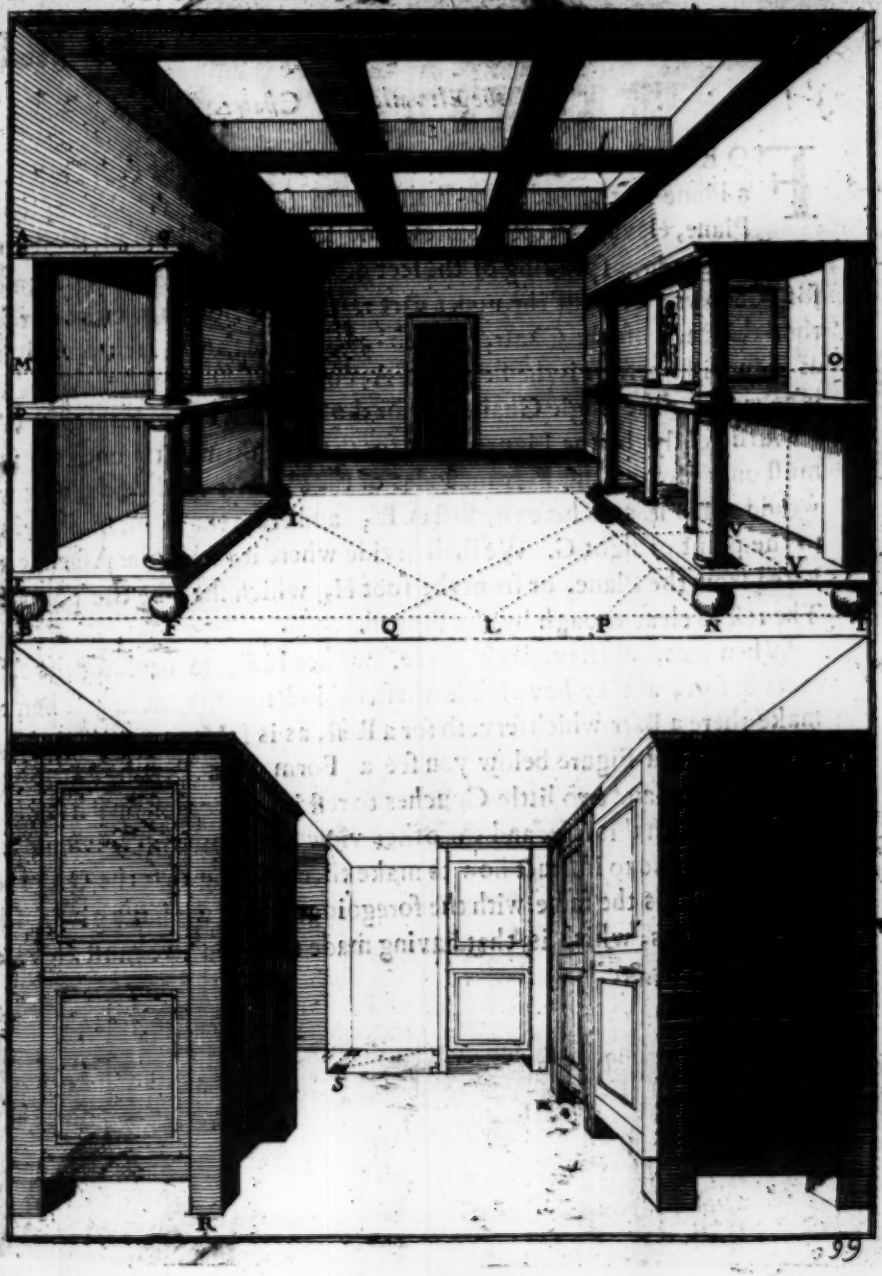


For to Elevate a Court-Cupboard and Cabinet.

HAving made the Plane, and Elevated Perpendiculars from all the Angles, as we have ſaid, we ſhall ſet upon the line A B, which ſhall ſerve here for the line of Elevation, the Meaſures that we will give, as well to the diſtance of the boards, as in their thickneſs, as are C D E, from the which points C D E, we muſt draw Parallels to the Baſe, unto the other Aſcent or Column F G. Then from the points which ſhall be marked upon this Aſcent G F, we muſt draw Rays to the point of ſight H, unto the other Aſcent of the Hollow I K. This Hollow is given at pleaſure, ſetting upon the baſe, that which we will give it; for example, for to have the hollow or bredth of this Cupboard, I have ſet the Meaſure F L, from this point L, we muſt draw to the diſtance M, and where the Ray F H ſhall be divided at the point L, that ſhall be the place of the laſt Aſcent.

The Cup-board which is over againſt on the other ſide, is ordered in the ſame manner, and for to finde the Meaſure of this little Cabinet which is in the midſt, bore up by two little Columns, we muſt take the points L P, which are in the midſt of Q N, and the bredth of the little Cabinet, and draw them to the diſtance O; and where the Ray N H ſhall be divided, we muſt draw Parallels to the baſe, which ſhall divide the Ray T H at the point V, from which raiſing Perpendiculars, we ſhall have for the little Cabinet of the middle.

The great Cabinet of the ſecond figure, are of the ſame Order with the Court Cup-boards above. There is none but that of the midſt, which is at the bottom, which we muſt a little explain, by reaſon that it is of the front, and that one might be in ſome trouble for to determine its hollow. I ſay then, we muſt frame its Plane, as we have ſaid heretofore, and as we ſee it finiſhed in the half; for to give it the Traverſes equal to the firſt in the fore-part; we muſt from the firſt Aſcent R, draw occult Rays to the firſt Perpendicular of the hollow S, and there to make little ſections, from which we muſt draw little Paralels to the baſe; and we ſhall have that we deſire.



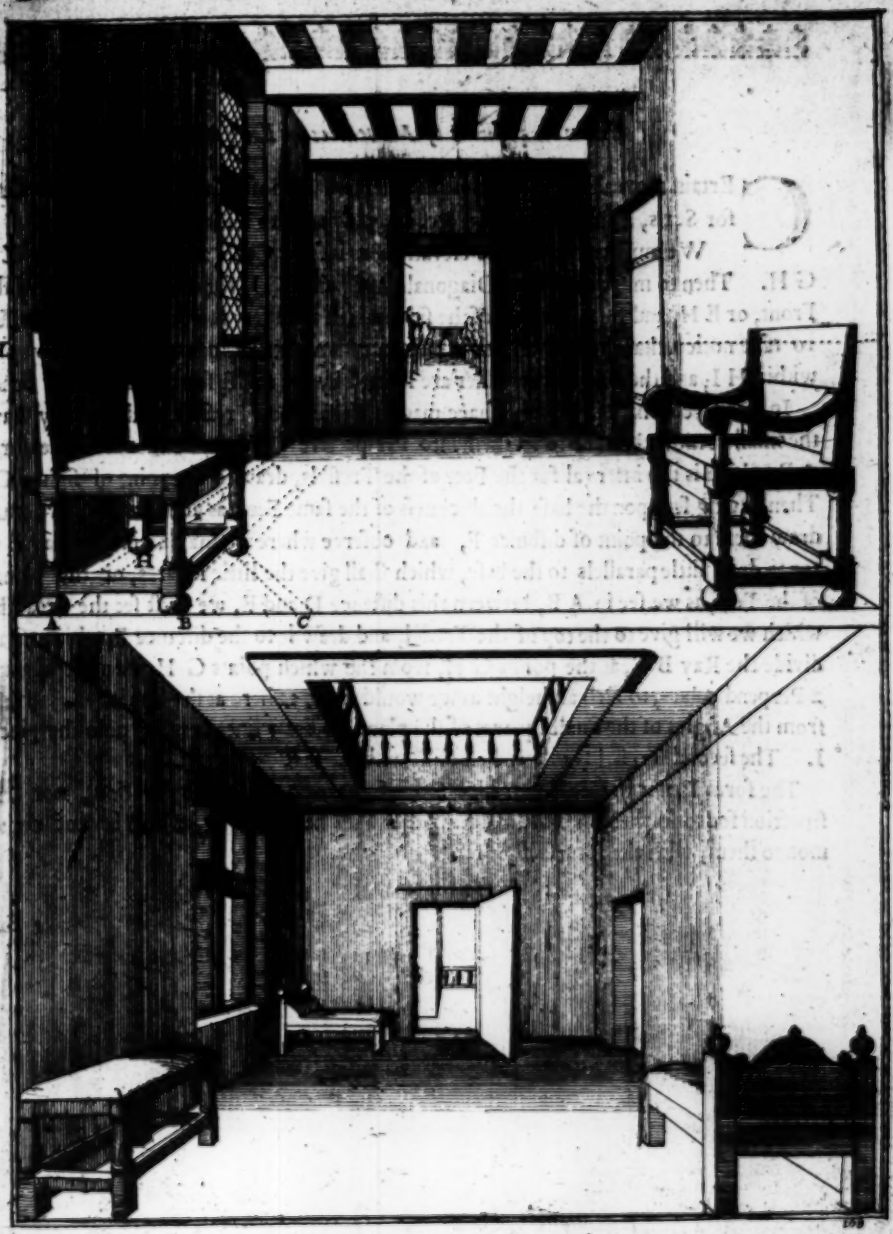
99

For the Elevations of Chairs.

FOR to elevate a Chair, you must of the Measures A B C, make a Plane by the ordinary Rules, and from the Angles of this Plane, elevate Perpendicules, and follow the same Method that we have given, speaking of the feet of the Table, or of the frames for windows, without the upper part: there is nothing more in this then the Back of the Chair, which one may make of such an height as they will: here it is the height of A, unto the seat K, and this height is as well for the single Chairs, as for those with Rests to lean on. We see sufficiently by the Figure, that for to make them with backs, we must only prolong the Perpendicules of the Ascents on the side, that we would make it, as is here the first A E; and from the point E drawing to the point of sight G. We shall divide where it ought the Ascent elevated from the Plane, or from the foot H, which shall be the point F. The rest is clear enough by the Figure.

When we would have Rests there, we need only to prolong the Ascents before, as they have made these behind for the back. Then to make there a Barr which serveth for a Rest, as is L M.

In the second Figure below you see a Form or a Bench garnished with carving, and two little Couches to rest in, whereof one hath the back turned on this side, and the other view'd obliquely. It would be to lose the time to instruct how to make them, seeing that the Order to elevate them, is the same with the foregoing, which we have given for the Moveables, which is, that having made the Plane, we must elevate Perpendiculars, &c.



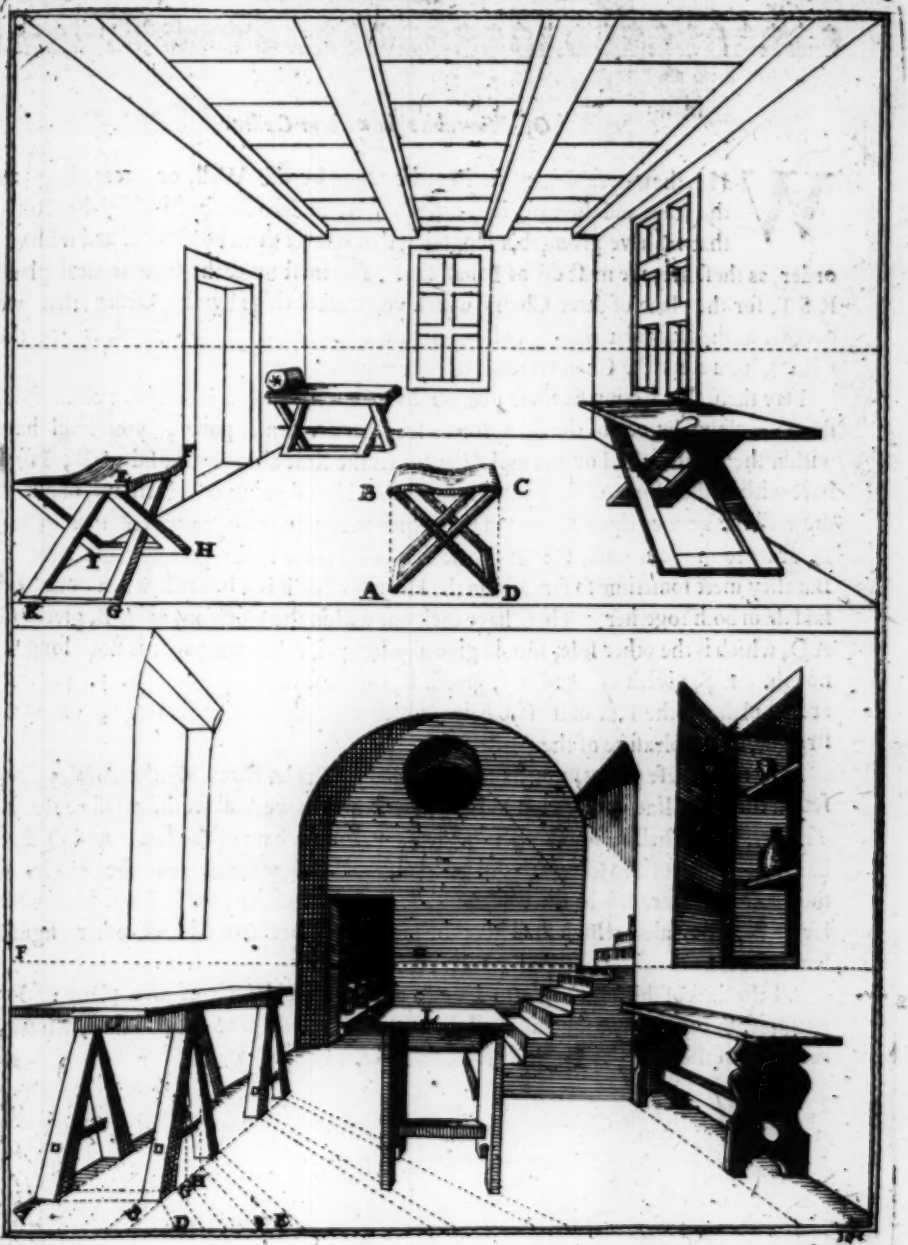
One other fashions of Moveables in Perspective.

CErtain moveables, which close themselves. Those which they make to serve for Seats, Tables, and Beds, &c. are very easie to set into Perspective.

We must only make the elevation, as if for a Cube; as is A B, C D, or E F G H. Then to make there two Diagonals A C, and B D, for that of the midst of the Front, or E H, and F G, for that of the side, which shall serve to bring in the 2 crosses, to take notice, that there be an half which entreth within the other, as G K, do pass within H I; and the one and the other are fastned by the midst for to make them bend.

In this piece which is below, I have made a Table upon Tressels, that we may have the smallest moveables for to set them into Perspective. We must from the measures A B, which is the interval for the Feet of the Tressels, draw to the point of sight C: Then having set upon the base the thickness of the same Feet, as are D and E, we must draw them to the point of distance F, and observe where we shall divide the Ray B C for to draw little parallels to the base, which shall give the little squares, or the planes of the Feet, as we see in A B, between this distance D and E, we must set the breadth, which we will give to the top of the Tressel, and draw it to the distance F, which shall divide the Ray B C, at the points G H, from the which points G H, we must elevate 2 Perpendiculars, to such an height as we would have, as here at the point I. Then from the Angles of the small squares of the plane, to draw lines bending unto the piece I. The second Tressel is ordered all alike with the first.

The form K, nor the Table, or high Stool L, have no need of Explication, nor Instruction for to set them into order, seeing that they have nothing, which is not common to them, with the fore-said pieces.


B
C
A
D
I
H
K
G
F

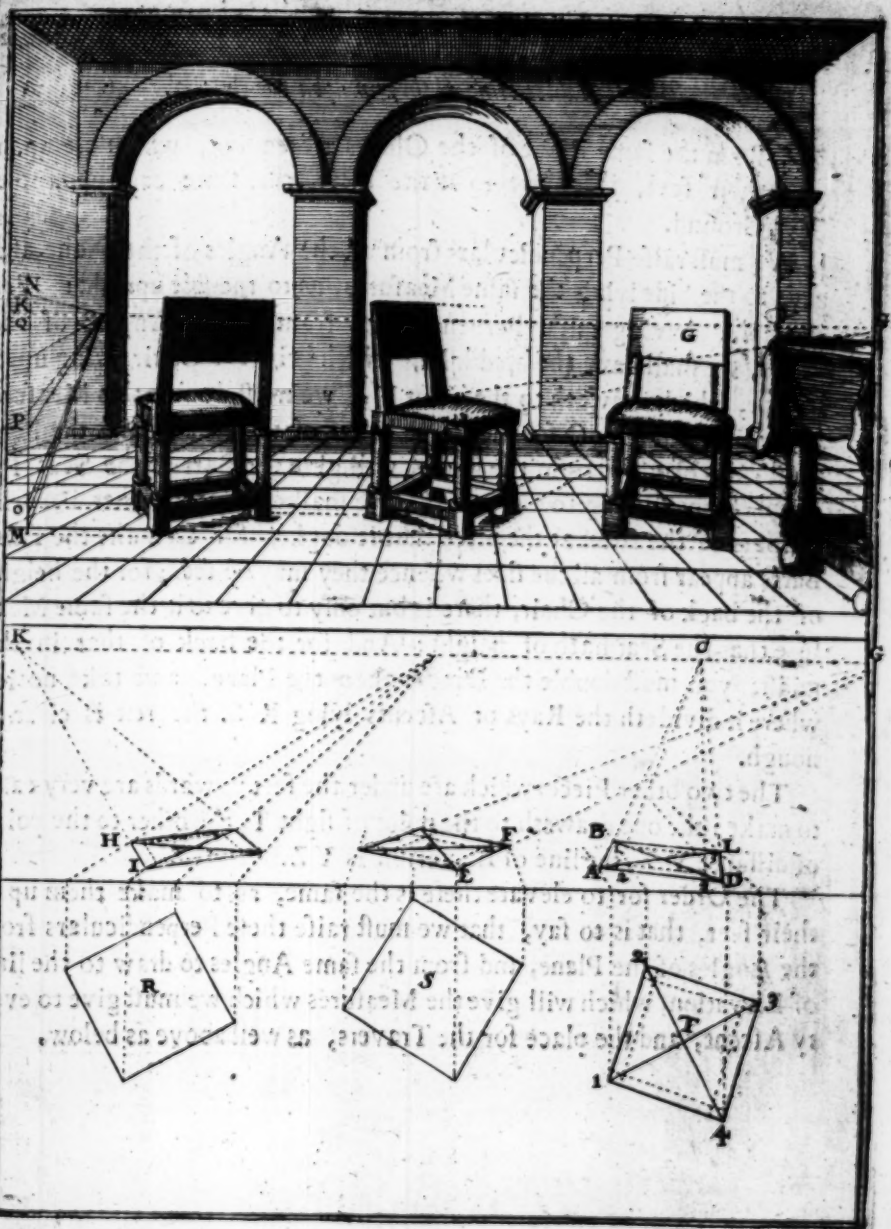
Of Moveables ſet without Order.

WHen the moveables are ſet in order along by the Wall, or according to the Rays and the baſe, it is eaſie to ſet them into Perſpective, by the Rules that we have given; but ſuppoſing that one ſet them by chance, and without order, as theſe are, we muſt do as I ſhall ſay. You muſt make the Geometrical plane R S T, for the plane of three Chairs, which you muſt abridge by the Order that we have ſet at the irregular figure, Fol 40. and the planes ſhall remain turned, as are the Chairs, or rather the Chairs turned, as are the planes.

I ſay then, that having ſet theſe planes into Perſpective, as it is taught, you muſt ſet the Rule along by one of the ſides, for to ſee what accidental point, you ſhall have within the Horizon: For example, having ſet the Rule along by the ſide A B, I ſhall have within the Horizon the point C, for the accidental point, at which we ought to draw all the lines of this ſide, and of that which is oppoſite to it, as we ſee that A and D, draw to the ſame point C: It is true that every plane ſet irregularly muſt have 2; But they meet ſometime ſo far within the Horizon that it is a hazard when one can find them both together These have each one within the Horizon, as A B, giveth C. A D, which is the other ſide, ſhould give another point, but our paper is not long enough. E F, giveth G And H I, giveth K, for theſe ſmall ſquares 1. 2. 3. 4. they are the plains of the Feet of theſe Chairs, which one may make more large, or more ſtreight, at the pleaſure of the Artiſt.

Now from theſe planes, you muſt elevate Perpendicules from all the Angles, and ſet on the ſide a line of elevation M N, upon the which we muſt ſet the meaſure for the Travers, as O, ſhall be for the Bars below. P, for the bars of the ſeat. And Q ſhall be for the backs of the Chairs. All being diſpoſed thus, we muſt from the Angles of the plane draw parallels to the baſe, unto the line of Elevation, and at the ſection to elevate Perpendicules, which ſhall give the meaſures, as we have ſaid of other figures heretofore

All the lines of the ſides ought to draw to the point accidentall of the plane: For example, in the chair of the midſt, all the ſides ought to draw to the point G, which is the point of the plane, as I make it to be ſeen in the figure.


N
K
O
P
O
M
G
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d
H
I
F
E
B
A
L
D
R
S
T
1
2
3
4
102

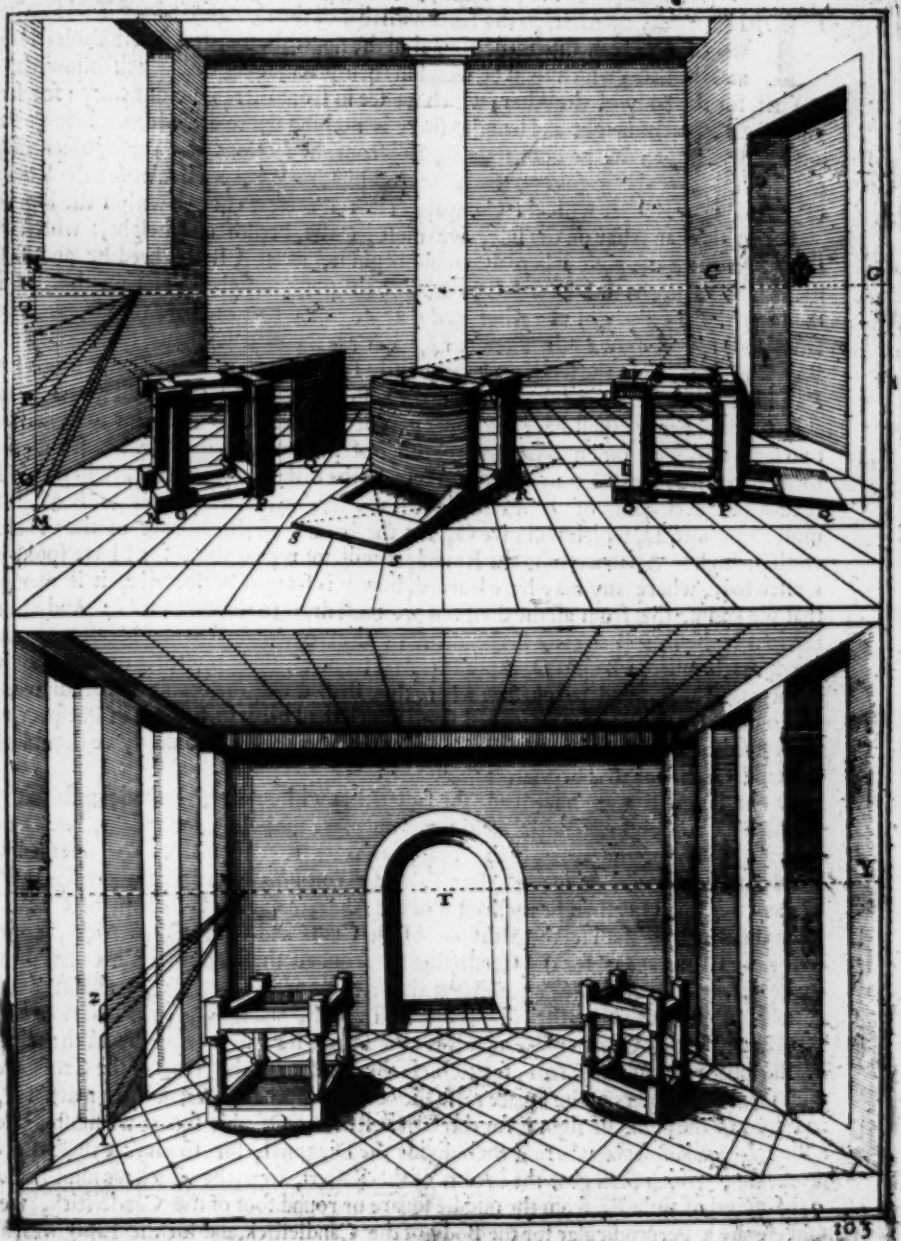
Of Moveables lying or thrown upon the Ground.

FRom the ſame Plane of the Chairs aforegoing, which are upon their feet, it is eaſie to make theſe which are caſt upon the Ground.

We muſt raiſe Perpendiculars from all the Angles of the Plane, and give to the Side lying the ſame Meaſures, as to the ſide upright: For example, having raiſ'd Perpendiculars from all the Angles of the Plane, we ſhall have the bredth M, which is in the Chair lying upon its ſide, which draweth to the point K; we muſt double this Meaſure M, which will give O for the Barre below of the Chair, and the Perpendicules elevated from the Plane, will give the Barr of the Seat P; from which drawing to the point K, we ſhall divide the other Perpendiculars of the front at the place that it ought, for to make the ſame Barrs appear from all the ſides whence they may be ſeen; for the height of the back of the Chair, there is but only to give to it the ſame Meaſure that the Seat hath of height: And for the back of that in the midſt, you muſt double the Diagonal on the Plane, and take notice where it divideth the Rays or Aſcents lying R S. the reſt is clear enough.

The two other Pieces which are under the feet upwards are very eaſie to make: the one draweth to the point of ſight T, the other to the point of diſtance V X, the line of Elevation is Y Z.

The Order for to elevate theſe is the ſame, as to make them upon their feet, that is to ſay, that we muſt raiſe theſe Perpendiculars from the Angles of the Plane, and from the ſame Angles to draw to the line of Elevation, which will give the Meaſures which we muſt give to every Aſcent, and the place for the Travers, as well above as below.


C
G
T
Y
103

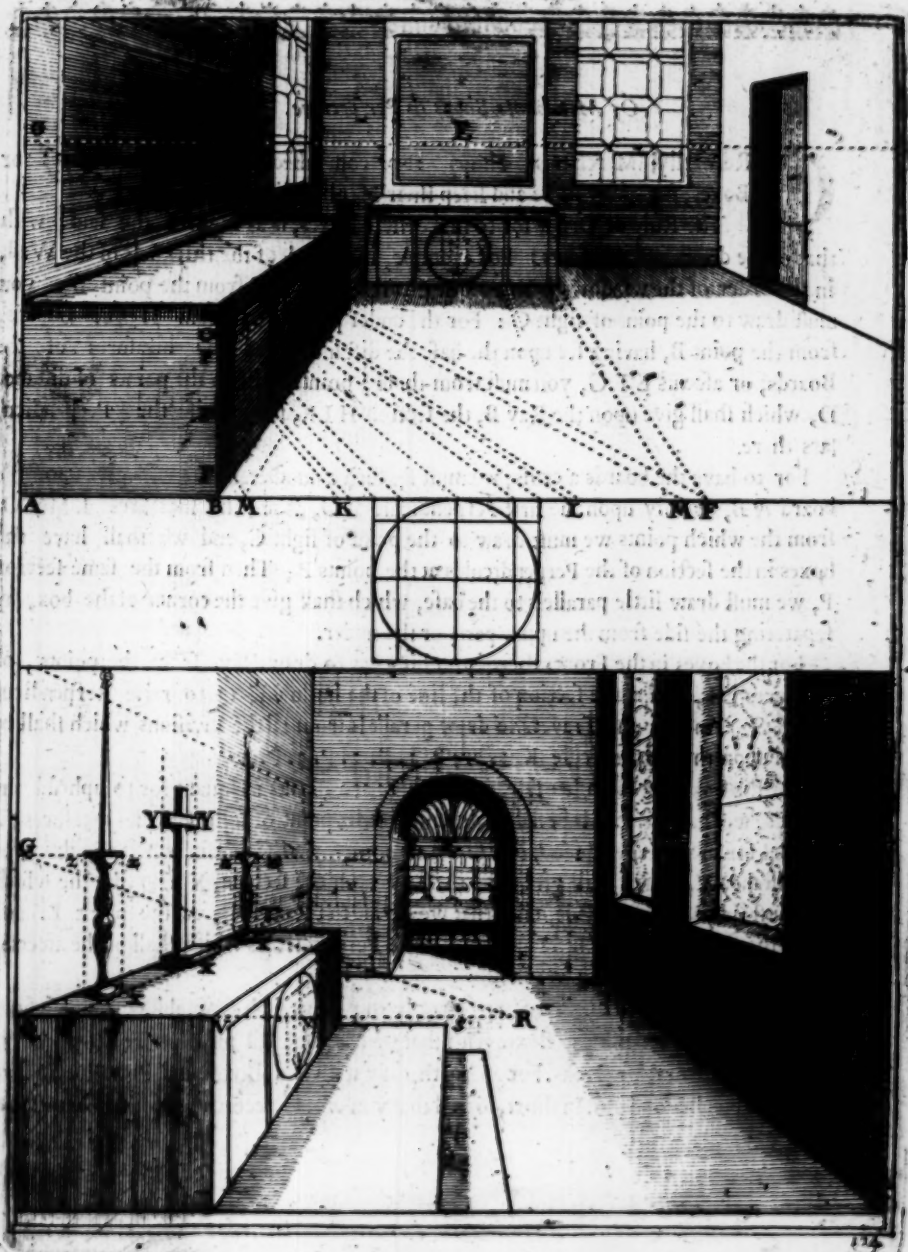
For to set Altars into Perspective.

THE Order of Altars, is the same with that of the frames of a long Table: that which is more in this, is the Round of the midst, the Borders of the Table-cloth, and the Laces which shall be found in their place, doing that which followeth.

First, for the body of the Altar, which we see in front there is no difficulty: for having given to it the height and length, there is nothing but to draw from all the points above the base, to the point of sight E, and from the sections that these points shall give to the line of the bottom of the Altar, you must raise Perpendicules for the Round of the midst, it is made with the Compass. The rest is clear enough within the Figure.

For to make an Altar on the side, we must set the bredth and height, which we should give it at the place where we would begin it, as is A B the bredth, and B D the height. Then from B D and C to draw to the point of sight E, seeing that B F is the length of the body of the Altar, and that we would give the same to this, we must from the point F draw to the distance G, and take notice where we shall divide the Ray B E, and from the section elevate a little Perpendicular, until that it touch the Ray D at the point H, and from H to make a little Parallel, which shall give I at the Ray C, and then we shall have the upper part of the Altar C D H I: for to have these two laces which are on one part, and the other of the Round: the points K L will give them upon the Ray B E, by drawing them to the distance G, and M will give the bredth of the Borders of the Table-cloth; and having taken the measure B M, we must bring it to D, which will give O, for the bredth of the Border of the Table-cloth on high As concerning the Round, I will not repeat that, for I have spoke of it elsewhere, where any may have learned, how it is set into Perspective, it is enough that we know, that from all the divisions we must draw to the distance G: And at the sections of the Ray B to raise Perpendicules; then to take these same Measures, and transport them from B unto O, as are P; And from all these Measures to draw to the point of sight E, and to observe where they shall divide the occult Perpendiculars, for to make by these points a crooked line, which shall give the Rounds in Perspective. If in stead of these laces, and of the Round, there were an Embroidery, we should use the same Order for to abbreviate it

In the Figure below I have made the same Altar without line, and adorned with a Cross and two Candlesticks; for to finde the place of these Candlesticks, we must prolong the line of the corner of the Altar, as is Q R; then from the distance G draw a line by the corner of the Altar T, and to continue it until that it divide that Q R; and this line Q R shall be the length of the Altar, equal to B F of the first figure, upon the which we shall set the Measures of the Cross and of the Candlesticks, as are V for the Cross, and S for the Candlesticks; from all these points S V we must draw to the distance G, and take notice that at the sections of the Ray Q E, we must draw little Parallels, which we shall divide by the Ray S E, and will give the squares above the Altar X for the Cross We must leave the square for the foot, and from the midst of the square elevate the Cross; for to finde the Measure of the Arms of the Cross, we must from the corners of the square raise the occult Perpendiculars, as it is mark'd Y, and draw to the point of sight E for the Candlesticks Of this square we must make a Round; and observe where it shall divide the Diagonal, for to elevate these Perpendicules, which shall give the bredth of the Basons, from the which we must draw to the point of sight E, from the middle square or round foot of the Candlestick, we must elevate a Perpendicular for the Body of the Candlestick, and for the Taper which we shall make as high as we will: for to proportion it, we must from the top of the first draw to the point of sight E, the rest hath already been said: the Figure will cause us to remember the Orders.


A
B M
K
L
M F
Y
Y
G
R

Of Merchants Shops in Perſpective.

ORdinarily Merchants Shops are compaſſed about with Shelves or Boxes, for to lay there and keep their Merchandize.

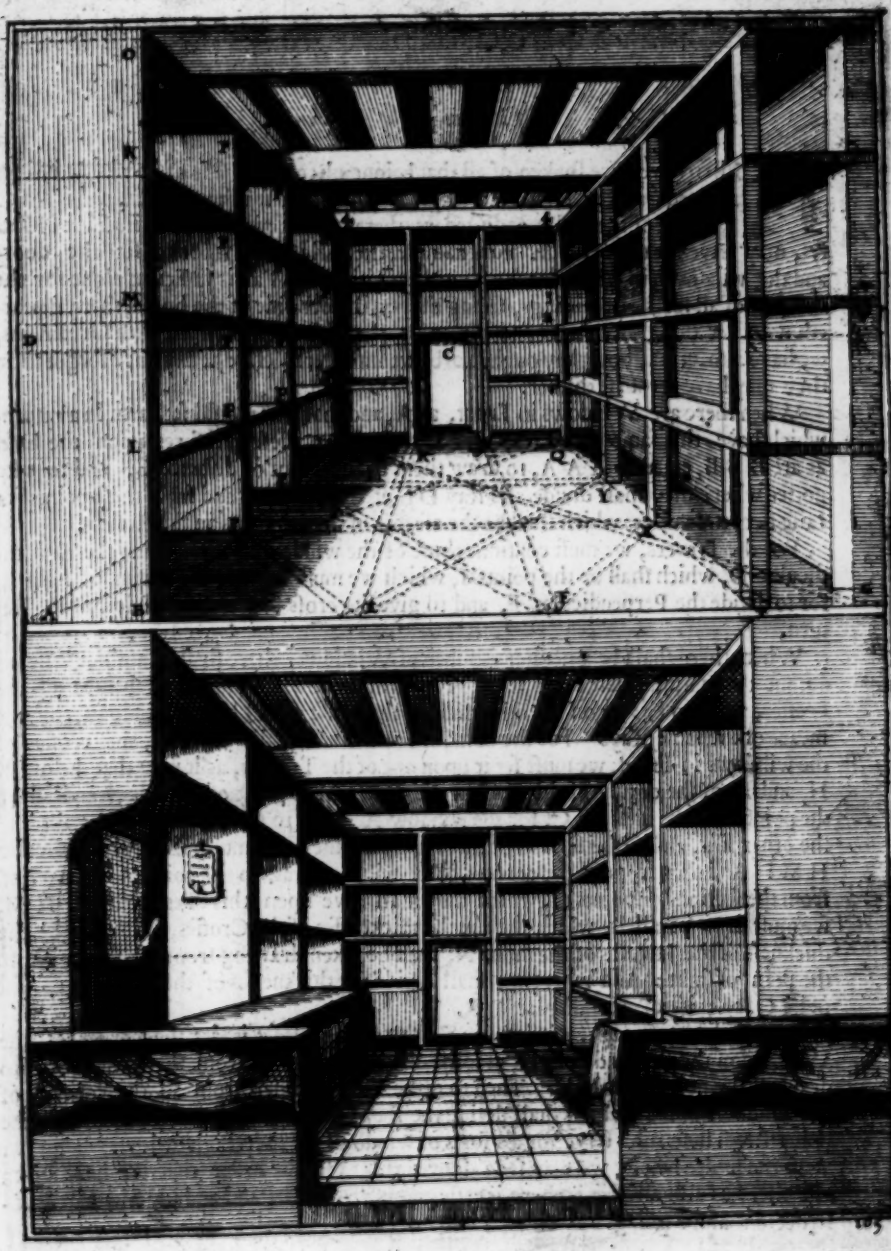
The Rule or Order for to make theſe Boxes, is as it were the ſame with that of the doors and windows: For example, if inſtead of the thickneſs of the Wall, in the order of the windows; You ſet in this the board A B from the point B, you muſt draw to the point of ſight C: For the under part, or bottom of the Boards, from the point B, having ſet upon the baſe the diſtances, and the meaſures of the Boards, or aſcents E F G, you muſt from theſe 3 points draw to the points of diſtance D, which ſhall give upon the Ray B, the ſection H I K, for to raiſe the Perpendiculars there.

For to have the boards a croſs, we muſt ſet ſuch a number, as we will give upon the board A B, or only upon the firſt Perpendicule B O, as are the meaſures L M N O, from the which points we muſt draw to the point of ſight C, and we ſhall have the boxes in the ſection of the Perpendicules at the points P; Then from the ſame ſection P, we muſt draw little parallels to the baſe, which ſhall give the corner of the box, by ſeparating the ſide from the upper part, or the under.

For the boxes in the Front, there is nothing but to draw Rays from the points, or meaſures E F, and at the ſection of the line of the hollow K Q, to raiſe Perpendiculars R S; And for the Travers to draw parallels from all the diviſions which ſhall be found upon the Perpendicule K, as are P. 1. P. 2. P. 3. P. 4.

For the boxes of the other ſide, where there are aſcents in ſquare for to uphold the boards, we ſhall have their breadth, drawing to the point of ſight C, the meaſures T G, and for to have their plane, or ſquare, we muſt from the meaſures A E F, draw to the diſtance V, which ſhall give upon the Ray T C, the ſection, X Y Q, by the which we muſt draw little parallels, until that we divide the Ray T G, at the point Z. and from the Angles of theſe little ſquares to raiſe Perpendicules which ſhall be the aſcents: as we ſee clearly in the figure.

The figure below ſheweth a Shop, already to receive ſuch moveables, as one would put there, and to furniſh the Boxes with that which you ſhall pleaſe. For a Library, we muſt fill them with Books. For an Apothecary with little Boxes, and Pots. For a Mercer, with bundles of ſtuffs. In ſhort, for all that you would, according to their occaſions.


O
K
M
D
L
d
105

Of the out-ſide of Buildings.

HItherto we have ſpoken of all that belongeth to the in ſide of houſes, buildings Churches, &c. Now we will give ſome orders for the out-ſide.

Many of the Rules and Orders, that we have given for the in-ſide of Houſes, may ſerve for the out-ſide. For example, the Rule which is for to ſet the doors and the windows, in what place one would within, the Wall is ſufficient alone for the out-ſide of all ſorts of buildings, ſeeing that on the out-ſide of the houſe, there appeareth no other thing then doors and windows. But if they be enriched with Ornaments, we have alſo given, how they ought to be ſet into Perſpective, if any have forgot them they may have recourſe thither.

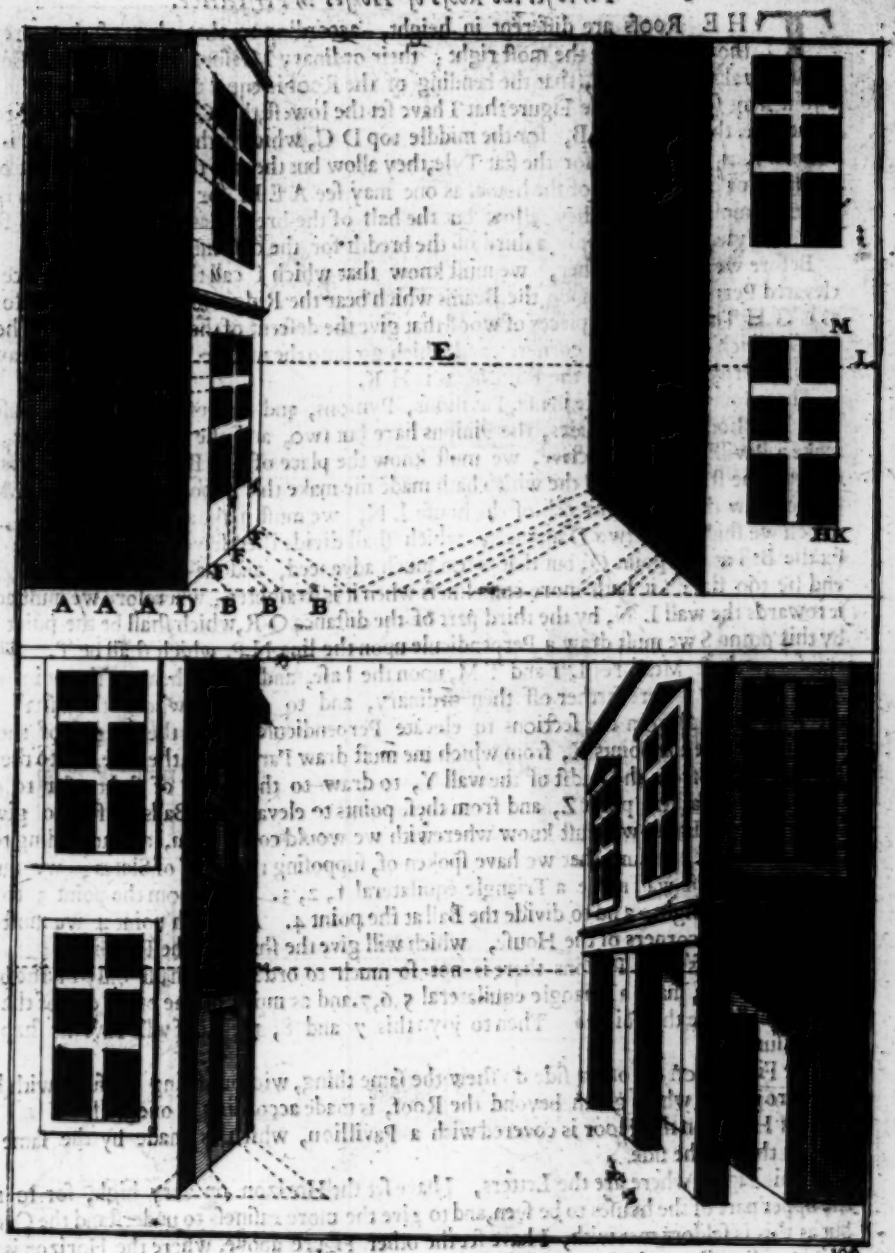
When there are Windows in Front, as A, and that one would ſet them in a return, which have the ſame meaſures, we muſt tranſport theſe meaſures upon the baſe, as are B B B, equal to A A A, to draw them to the point of diſtance C, and to take notice where they ſhall divide the Ray D E, at the points F, and from theſe points to raiſe Perpendiculars which ſhall be the aſcents of the windows in the Return.

For the Travers, we muſt continue thoſe of the window in Front, unto the Perpendicular D, which ſhall be the points I, which we muſt draw to the point of ſight E, for to divide the Perpendicules F, and to give the croſs bars to the window of the Return.

When there ſhall be a greater number of Windows, there ſhall be nothing elſe to do, but to continue their Rays, for to give them the ſame meaſure and height of the croſſes, as is to be ſeen on the other ſide, at the houſe which hath 2 windows, by the means of the ſame Rays For the breadth or thickneſs of the Jawmbs, and croſſes of the windows in Front, we muſt ſet it upon one of the Travers, as it is at that below K H, and from the corner of the window K, draw to the point of ſight E, and from the point H to the diſtance C, for the window A. And to the diſtance L, for that of the other ſide, and at the ſection of theſe two laſt lines, we muſt raiſe a Perpendicular H M: And then from all the corners of the window draw to the point of ſight And from the ſections or points Q, which they ſhall give upon this Perpendicule H M, we muſt draw parallels, which ſhall be the thickneſſes of the Croſſes, or Travers: The thickneſs of the Jawmbs of the midſt N, ſhall be taken drawing from the corner N, to the poin: of ſight: And where we ſhall divide the thickneſſes of the Travers at the point Q, to raiſe a Perpendicular Q R.

For the thickneſs of the windows in Return, you muſt ſet it at the corner of the Wall, upon the Perpendicule D, as is the diſtance I O, and from the points O, to draw to the point of ſight E Then to make little parallels from all the corners of the windows as S T, which ſhall divide the Ray O, and ſhall give the thickneſs at the point S. Theſe rules ſerve for all ſorts of windows, be they high or low.

In the figure below, we may ſee a door abridged by the order that we have given elſewhere: as alſo all that is there, is eaſie enough to underſtand and practice by the inſtructions afore-going.



E

For to set the Roofs of Houses in Perspective.

THE Roofs are different in height, according to that whereof they are made: those of slate are the most right; their ordinary Measure is the Triangle Equilateral, that is to say, that the bending of the Roof is equal to the bredth of the house, as one may see by the [illegible] Figure that I have set the lowest, [illegible] is equal to A B Others set this bredth A B, for the middle top D C, which [illegible] that is not so ordinary, as this D C; for the flat Tyle, they allow but the [illegible] height of those of Slate, or of the bredth of the house, as one may see A E B: for the Thatch, which is a Covering commonly used, they allow but the half of the bredth, as if A F B. And for the hollow Tyle, they allow only a third of the bredth for the descent, as is A [illegible] B.

Before we pass any farther, we must know that which I call the [illegible] Top, are Pieces elevated Perpendicularly upon the Beams which bear the Ridg where [illegible] rafters do meet, as is G H The rafters are pieces of wood that give the descent of the [illegible] H I. The other Pieces which are set in the corner, and which go unto the middle Top, are called Stays, and are ordinarily longer then the Rafters, as is H K.

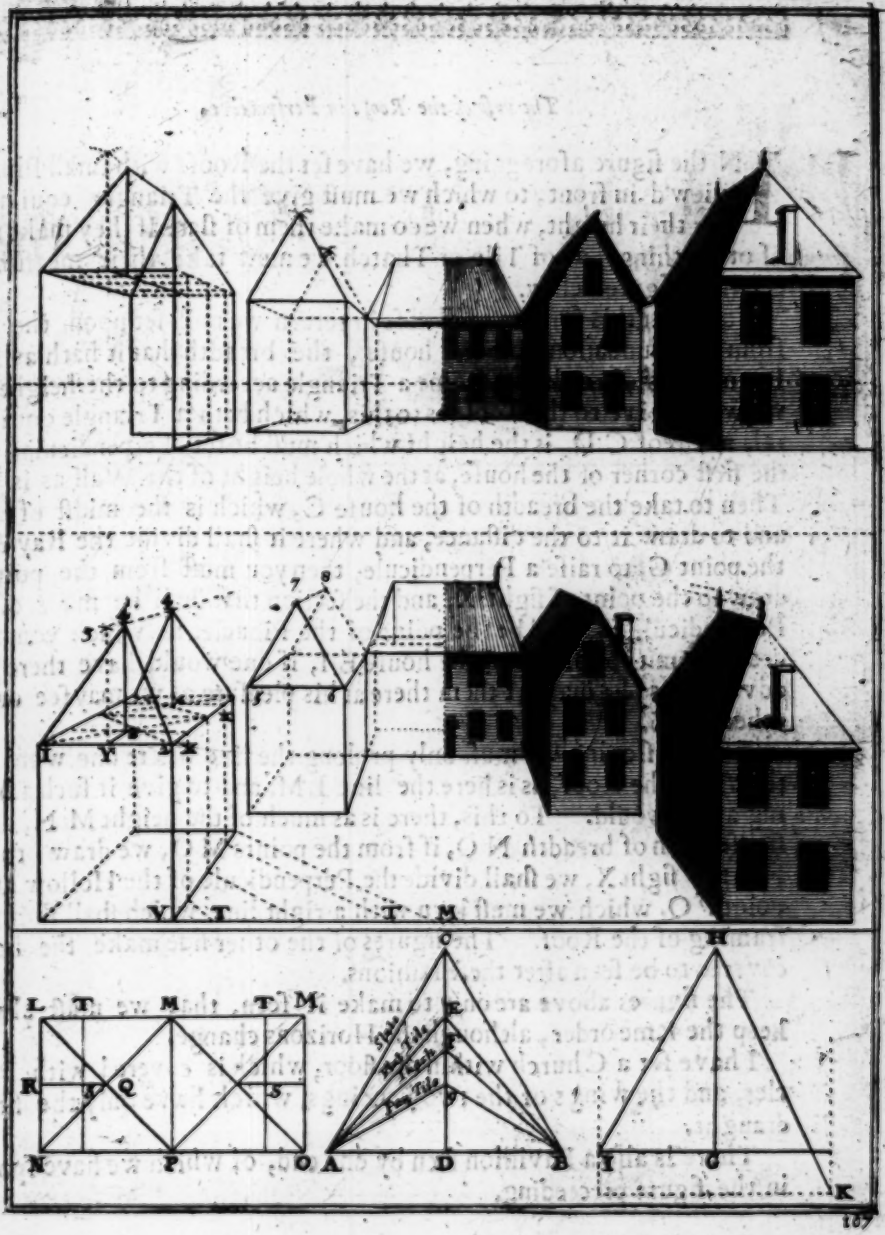
Three sorts of Roofs are in use, Pavilions, Pynions, and Appentis, or Pent-house like The Pavillions have four sides, the Pinions have but two, and the Appentis but one; for to make a Pavillion in Perspective, we must know the place of the Balls or middle tops, for to draw the stays thither: the which hath made me make this Geometrical Plane L M N O, for to shew that of the bredth of the house L N, we must make a square L M N P, from which we shall draw two Diagonals, which shall divide themselves at the point Q: some set the Ball at this point Q, but that is too much advanced, and maketh this bending of the end lie too flat: it hath more comeliness when it is straighter; wherefore we must advance it towards the wall L N, by the third part of the distance Q R, which shall be the point S, and by this point S we must draw a Perpendicule upon the line N P, which shall be T. Then to transport these Measures L T and T M, upon the base, and draw them to the point of distance, which is here farther off then ordinary, and to observe where they shall divide the Ray V; and from the sections to elevate Perpendicules unto the height of the wall, which shall give the points X, from which me must draw Parallels to the base, unto the other Ray I. Then from the midst of the wall Y, to draw to the point of sight, for to divide those Parallels at the point Z, and from these points to elevate the Balls; for to give the height to these Balls, we must know wherewith we would cover them, and according to that to give them the Measure that we have spoken of, supposing that it be of Slates; we must of the bredth of the wall make a Triangle equilateral 1, 2, 3. And from the point 3 to draw to the point of sight, and to divide the Ball at the point 4. At which point 4 we must draw lines from the corners of the House, which will give the shape to the Pavillion.

For the Roofs with Pinions there is not so much to order, we must only of the bredth of the wall 5, 6, make a Triangle equilateral 5, 6, 7. and as much on the other end of the wall, which shall give the point 8 Then to joyn this 7 and 8, the Roof will have its shape and its measure.

The Figures on the other side do shew the same thing, without being confused with lines: This projecting which goeth beyond the Roof, is made according as one will.

This House on the Floor is covered with a Pavillion, which is made by the same Orders as that on the side.

In this Figure where are the Letters, I have set the Horizon on very high, for to make the upper part of the houses to be seen, and to give the more easiness to understand the Order; but as this is seldom met with, I have set the other Figure above, where the Horizon is low, as it is ordinarily, which nevertheless is not therefore any other Rule for to make the Roof, then that below, as one may see by the Figure.



107

The reſt of the Roofs in Perſpective.

IN the figure aforegoing, we have ſet the Roofs with ſmall Pinacles view'd in front, to which we muſt give the Triangle equilateral for their height, when we do make them of ſlate: If they make them of other things, as of Tile or Thatch we muſt take their meaſures at the little figure below.

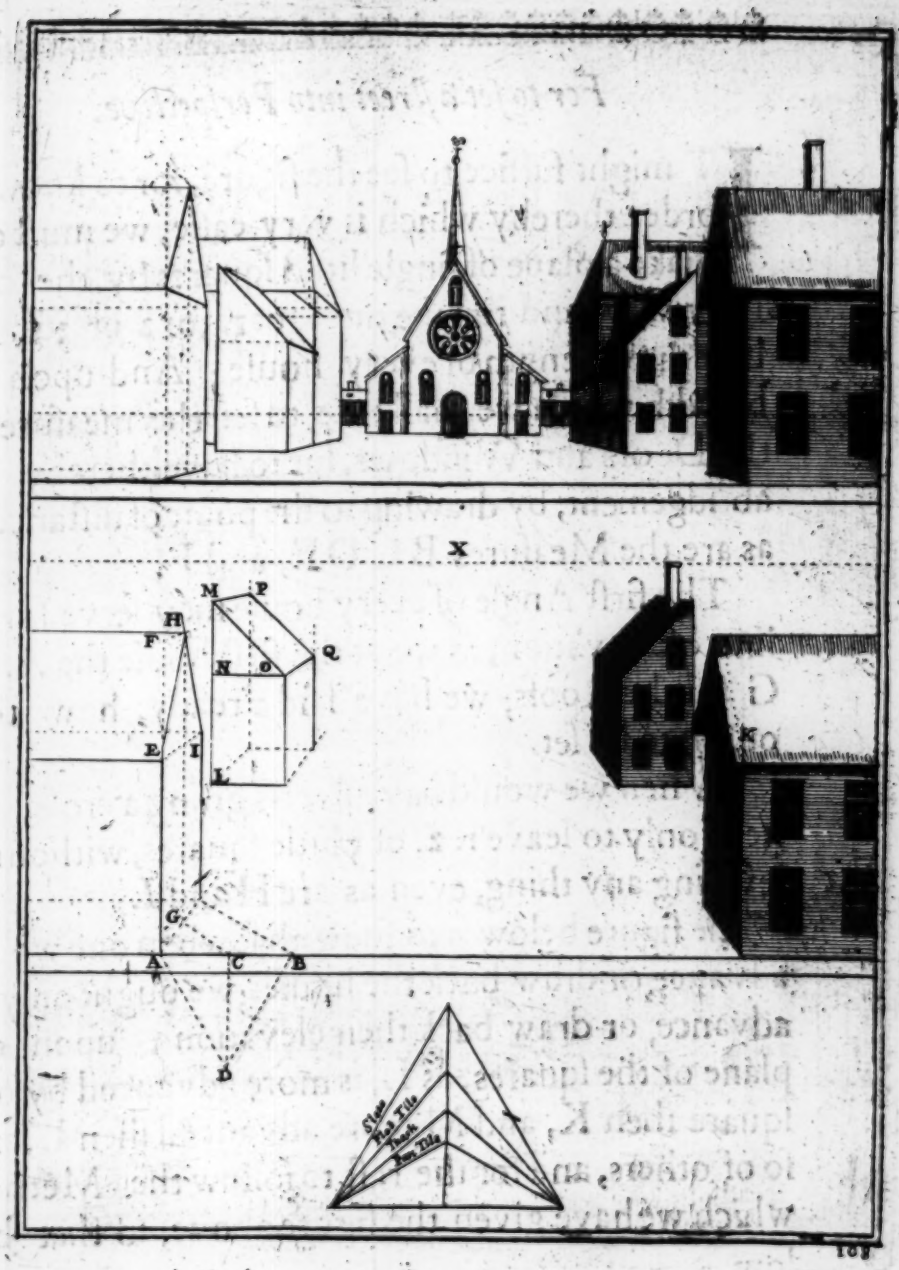
For to ſet this faſhion of Roofs in return we muſt ſet upon the baſe from the foundation of the houſe, the breadth that it hath as is A B, and of this breadth to frame a Triangle according to the height that we would give to the Roof, as to this, which hath a Triangle equilateral, whereof C D, is the height which muſt be ſet Perpendicularly at the firſt corner of the houſe, at the whole height of the Wall as is E F. Then to take the breadth of the houſe C, which is the midſt of A B, and to draw it to the diſtance, and where it ſhall divide the Ray A, at the point G, to raiſe a Perpendicule; then you muſt from the point F draw to the point of ſight X, and the ſection that ſhall be made of the Perpendicule H, ſhall be the point of the Pinacle, to which you muſt draw from the corners of the houſe E I, if one would have there any advancings, he may ſet them there at his pleaſure as we may ſee on the other ſide K.

For the ſloping we muſt only prolong the line where one would ſet the top of the Roof, as is here the line L M, and to give it ſuch a bending as we would. To this, there is as much of the height M N, as the houſe hath of breadth N O, if from the points M O, we draw to the point of ſight X, we ſhall divide the Perpendicule of the Hollow at the point P Q. which we muſt joyn with a right line, which ſhall finiſh the framing of the Roof. The figures of the other ſide make the houſe covered to be ſeen after theſe faſhions.

The figures above are only to make it ſeen, that we muſt always keep the ſame order, although the Horizons change.

I have ſet a Church within the floor, which is covered with Pinacles, and the wings of the two bendings, which have only the ſimple draught.

There is alſo a Pavillion ſeen by one end, of which we have ſpoken in the figure preceeding.


X
M
P
H
F
Q
N
O
E
I
L
G
A
C
B
D
K
Slate
Flat Tile
Thack
Pan Tile

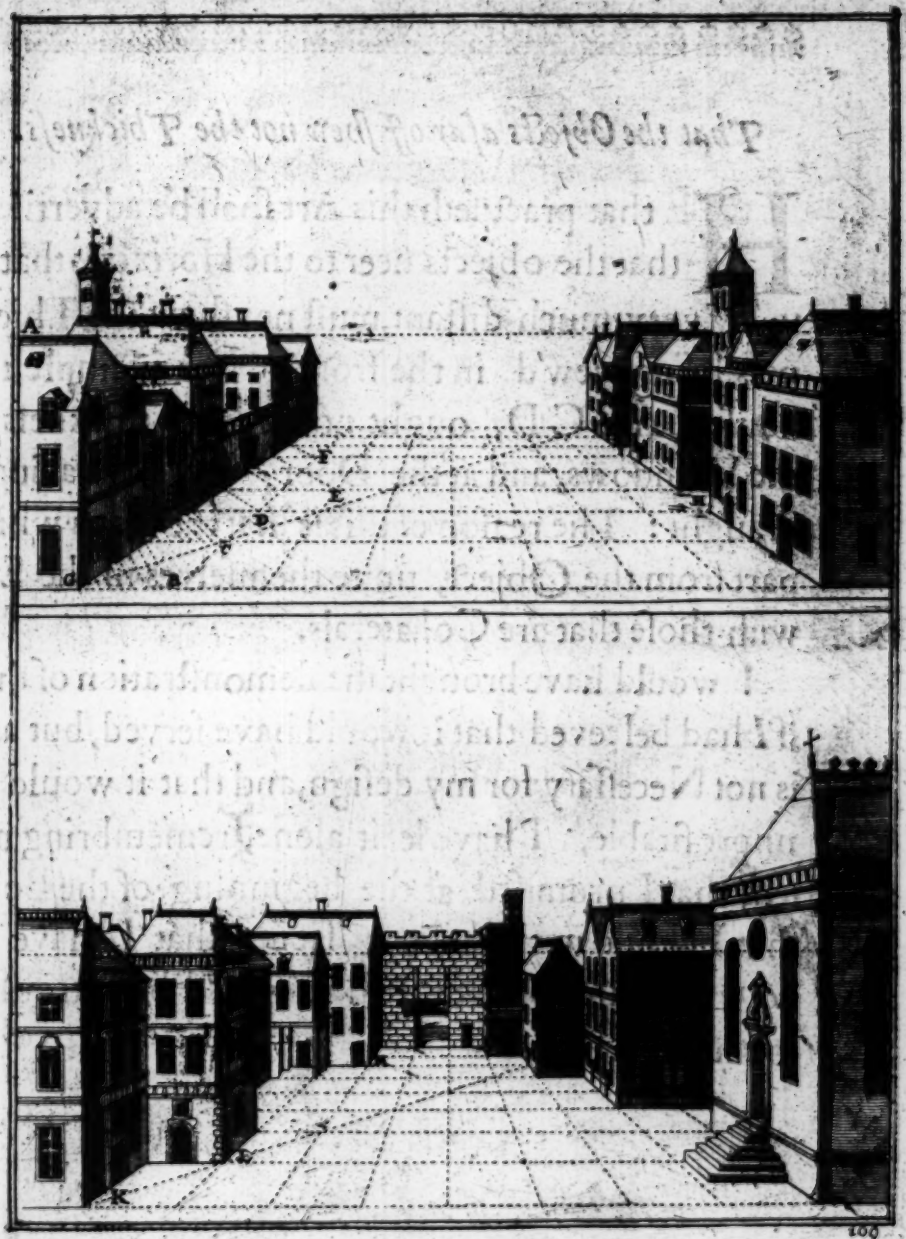
For to set a street into Perspective.

IT might suffice to see the figure, for to know the order thereby which is very easie, we must only make a plane of single little squares by the ordinary way, and to take one square, or 2 or 3 for the bredth, or length of every house; And upon this breadth which we shall take, to set the measures of the Doors and Windows, for to have thereby the abridgement, by drawing to the point of distance A, as are the Measures B C D E, and F.

The first Angle of every house may serve for the line of elevation, as we at the first house the Angle G for the Roofs; we have said already, how they ought to be set.

When we would have streets going a cross, we need only to leave 1. 2. or 3 little squares, without elevating any thing, even as are H and *I*.

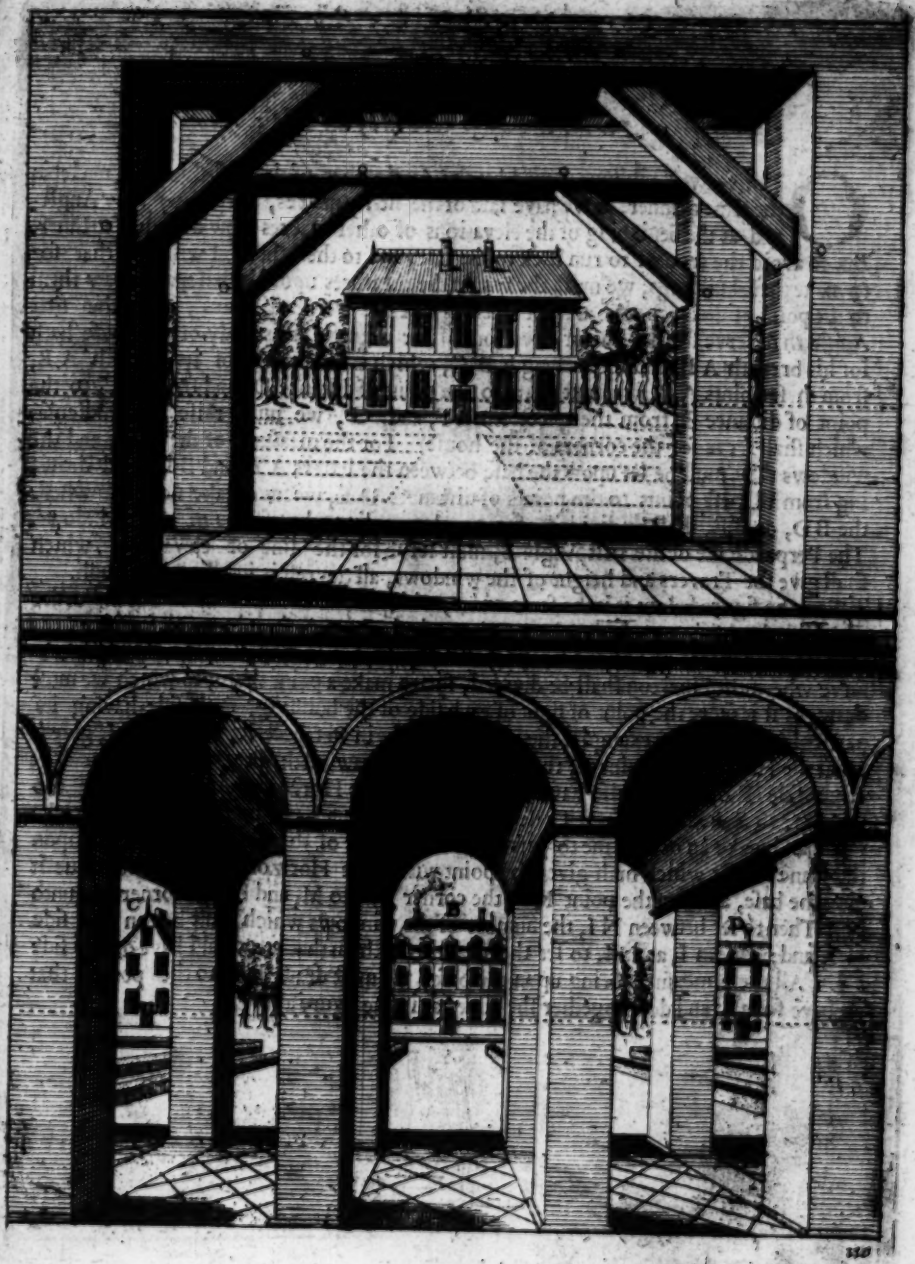
The figure below is to shew that when one would advance, or draw back the houses; we ought only to advance, or draw back their elevation, upon the plane of the squares, as L, is more advanced by one square then K, and M more advanced then L, and so of others, and for the rest to follow the Method which we have given the figure above, to that below.


A
109

That the Objects afar off ſhew not the Thickneſs.

HE that practiſeth this Art ſhall be advertiſed, that the objects neer to the Horizon, that is to ſay very much diſtant, muſt not ſhew the Thickneſs being view'd in the front, For example, the houſes, A B C D, ought not to have thickneſs at the Windows, and at the Door; But only a ſingle draught: The reaſon of this is that the Rays which part from the Object, unite themſelves in the Eye with thoſe that are Collaterals.

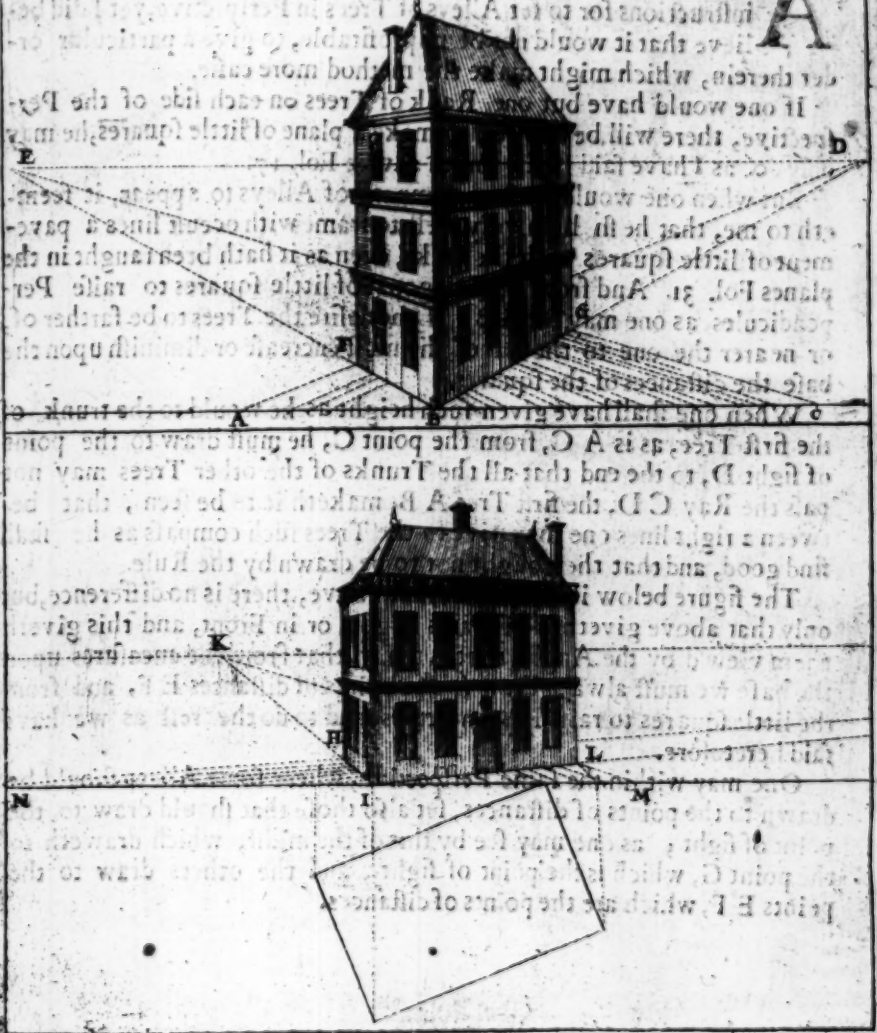
I would have brought the demonſtration of this, if I had beleeved that it would have ſerved, but as it is not Neceſſary for my deſign, and that it would be unprofitable, I have let it alone, remembring my ſelf, that I promiſed at the beginning of the Book that I would not give any, ſeeing that I have to do with many perſons, which would be in trouble to underſtand them.



For the Buildings viewed by the Angle.

OF theſe two buildings view'd by the Angle, that of the firſt figure is made in the ſame manner, as we have ſaid of the little ſquares, view'd by the Angle; and at the beginning of the elevations of other pieces view'd in like manner. But to avoid the trouble to run back to the one, and to the other: I will ſay, that for to make theſe buildings, we muſt always ſet the meaſures upon the baſe, and draw them to the point of diſtance; and at their ſections to raiſe Perpendiculars, and the firſt Angle ſhall ſerve for the line of elevation: For example, this body of an houſe hath for his breadth A B, and for its length B C, which is the double of its breadth A B, from theſe points A B, we muſt draw to the point of diſtance D, and from B C, to the point of diſtance E, from their ſections B F, and G, we muſt raiſe Perpendicules which ſhall ſerve for the corners of the houſe. For the meaſures of the doors and the windows they muſt be ſet upon the baſe between the letters A B, and B C, and drawing from all theſe points to the points of diſtances D E, we muſt take notice, where the B D, or B E, ſhall be divided, for to elevate there the aſcents of the windows. The Perpendicule of the firſt Angle B, muſt ſerve for the line of elevation, which ſhall give the Travers and height of the windows, all the reſt is intelligible enough.

For the figure below it is the ſame order, with that of the Chairs without order which is, that having made the plane Geometrical, we muſt ſet it into Perſpective, as the irregular pieces. Then to ſet the Rule at every bending of the plane, and to obſerve where the Horizon ſhall be divided, for to make a point there, to which we muſt draw, as if it were the point of ſight of each ſide of the building, each ſide having its particular point. For example, the plane being ſet in Perſpective, the ſide H I, giveth upon the Horizon the point K, to which we muſt draw all the Rays of this ſide: The other ſide I L, muſt alſo have its point within the Horizon, but our paper is too ſhort for to make it be ſeen. Theſe 2 points being found, we muſt place there the Rule, and make an occult line to paſs by the other ſide of the building parallel upon the plane to that which hath given the point within the Horizon; and to continue it unto the baſe, as from the point K by the corner L, unto M; and by the corner H, unto N: Then to ſet between N I, the number of the windows which muſt be on the ſide H I, and between I, and M, to ſet the meaſures of them that we would have on the ſide I L: All theſe meaſures being upon the baſe, we muſt draw them to the points that we have found, and do altogether the ſame, as in the figure above.


E
D
A
K
H
L
N
I
M
m

For to set Alleys of Trees in Perspective.

ALthough that by the orders fore-going one might draw sufficient instructions for to set Alleys of Trees in Perspective, yet I did believe that it would not be unprofitable, to give a particular order therein, which might make the method more easie.

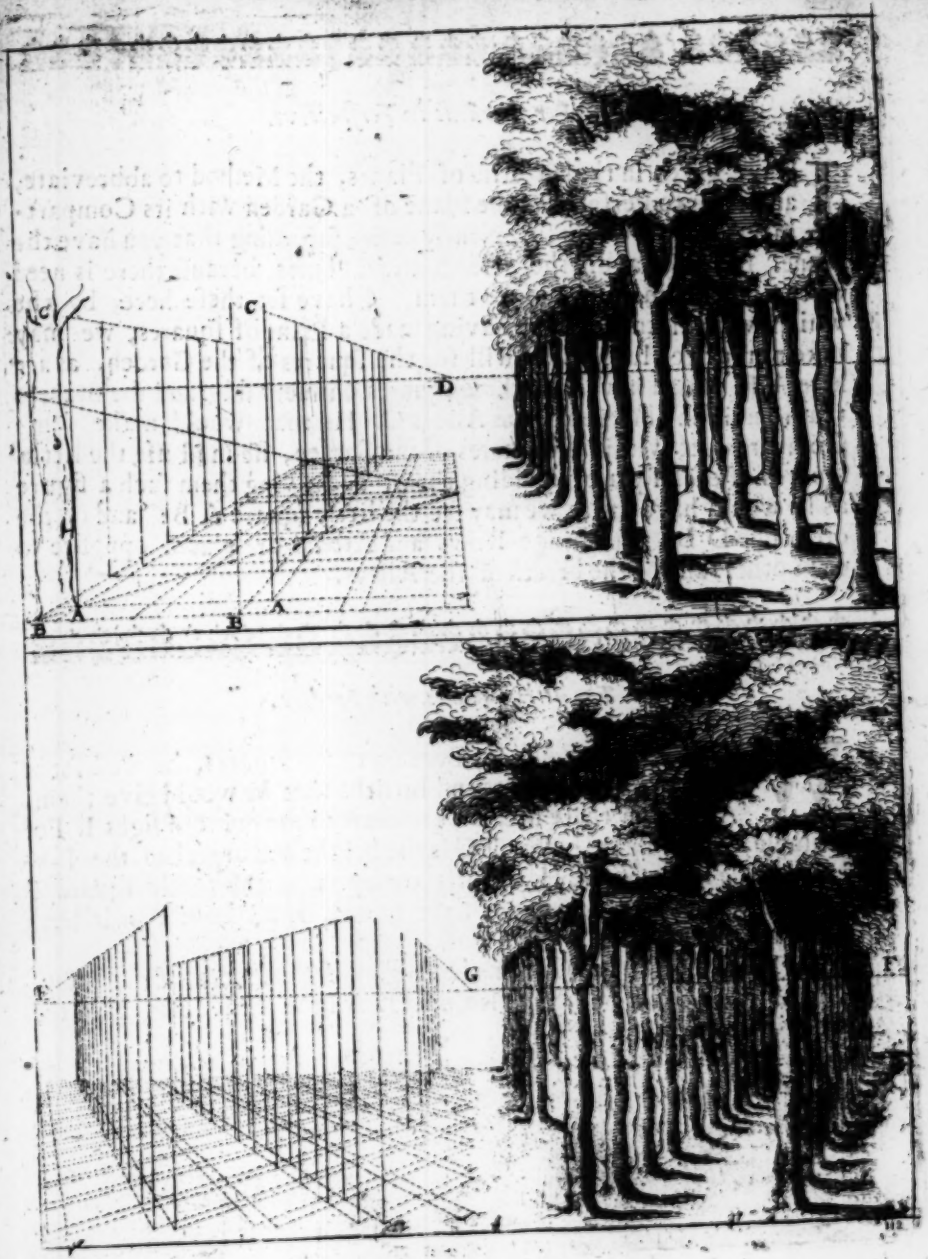
If one would have but one Rank of Trees on each side of the Perspective, there will be no need to make a plane of little squares, he may only do, as I have said in the fourth advice Fol. 17.

But when one would make a company of Alleys to appear, it seemeth to me, that he sh ll do very well to frame with occult lines a pavement of little squares with the Oaks, even as it hath been taught in the planes Fol. 31. And from the Diagonal of little squares to raise Perpendicules, as one may see A B; If one desire the Trees to be farther of, or nearer the one to the other, he must encrease or diminish upon the base the distances of the squares.

When one shall have given such height as he would to the trunk of the first Tree, as is A C, from the point C, he must draw to the point of sight D, to the end that all the Trunks of the other Trees may not pass the Ray C D, the first Tree A B, maketh it to be seen, that between 2 right lines one may give to the Trees such compass as he shall find good, and that they ought not to be drawn by the Rule.

The figure below is ordered as that above, there is no difference, but only that above giveth the squares Right, or in Front, and this giveth them view'd by the Angle, that is to say, that from the measures upon the base we must always draw to the points of distances E F, and from the little squares to raise Perpendicules, and to do the rest as we have said heretofore.

One may within the same Perspective, where some Alleys should be drawn to the points of distances, set also those that should draw to the point of sight; as one may see by this of the midst, which draweth to the point G, which is the point of sight, and the others draw to the points E F, which are the points of distances.


C
C
D
B
A
B
A
G
F

For Gardens in Perſpective.

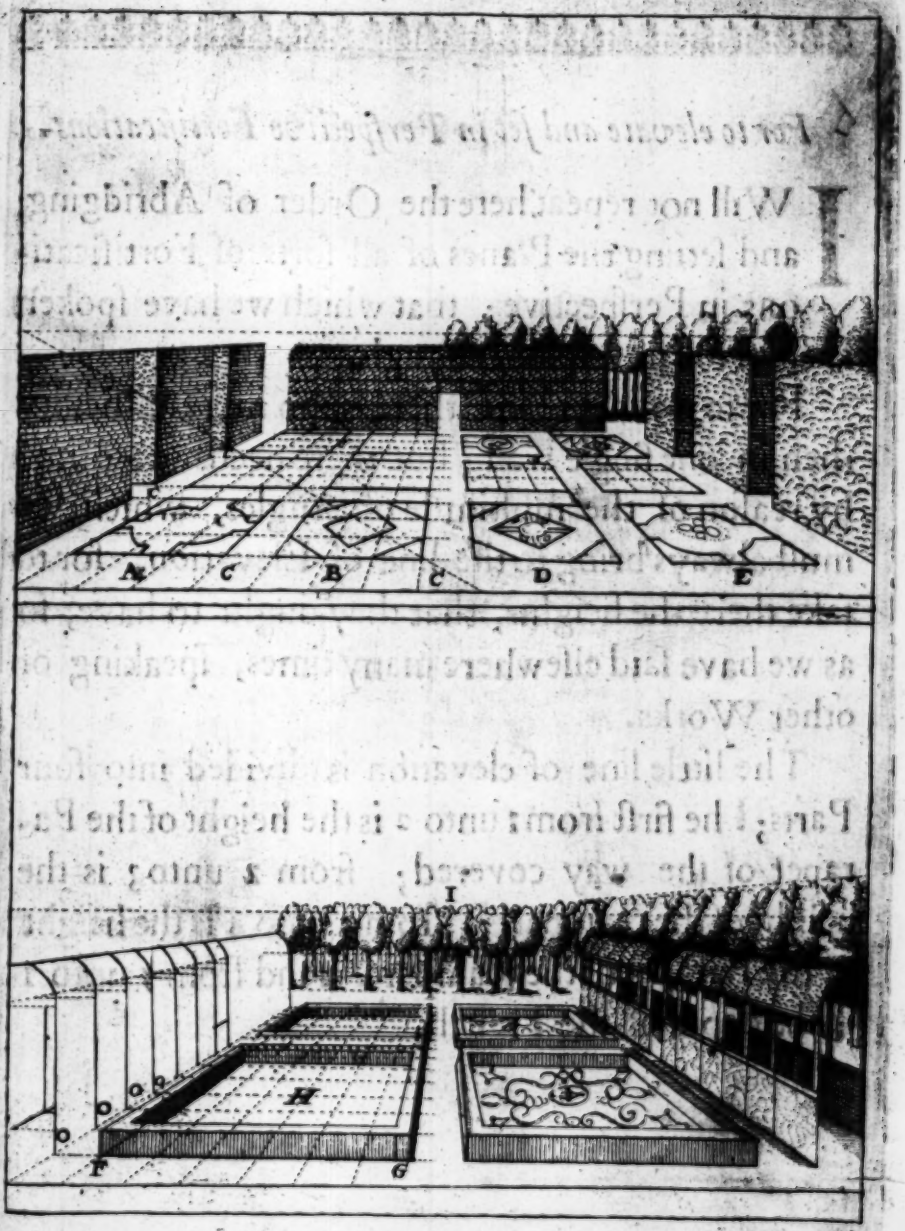
I Have given in the Treatiſe of Planes, the Method to abbreviate, and ſet into Perſpective the Plane of a Garden with its Compartments, by an Order ſufficiently eaſie; ſuppoſing that you have the Plane. But as I avoid theſe Geometrical Planes, becauſe there is need of too much time for to make them, I have ſet theſe here, by the which we ſhall know, that having made a Plane of ſquares, we may take as much or little as we will for the ſquares of the Garden, as are here A B, which have each three ſquares on every ſide: and the ſquares that remain ſhall ſerve for the Alleys C. He that would make ſome Compartment within the ſquares of the Garden, he muſt uſe the little ſquares of each ſquare, dividing them, and giving them ſuch a figure as he would have, ſo as we may ſee the little ſquare A B: and on the other ſide D E: the hedge-Rows and Arbors are placed oppoſite to each other, and of the bredth of the Alleys.

The little Squares with Borders.

WHEN one would ſet Borders to the ſquares, he muſt ſet at the corner the heights and bredths that he would give them. And from theſe Meaſures to draw to the point of ſight I. For example, in the figure below F G is the height and bredth of the Borders of the little ſquare H, from the corners of this little ſquare F G, we muſt draw to the point of ſight I, and do all the reſt as it hath been ſaid ſeveral times.

For the Arbors, we muſt from the Angles of the ſquares of the Alley, elevate the Aſcents or Perpendiculars O. All the reſt is done, as in the Arches view'd by the ſide, fol. 60.

The little wood which is at bottom is made by elevating Perpendiculars from all the Angles of a Pavement of little ſquares, &c.

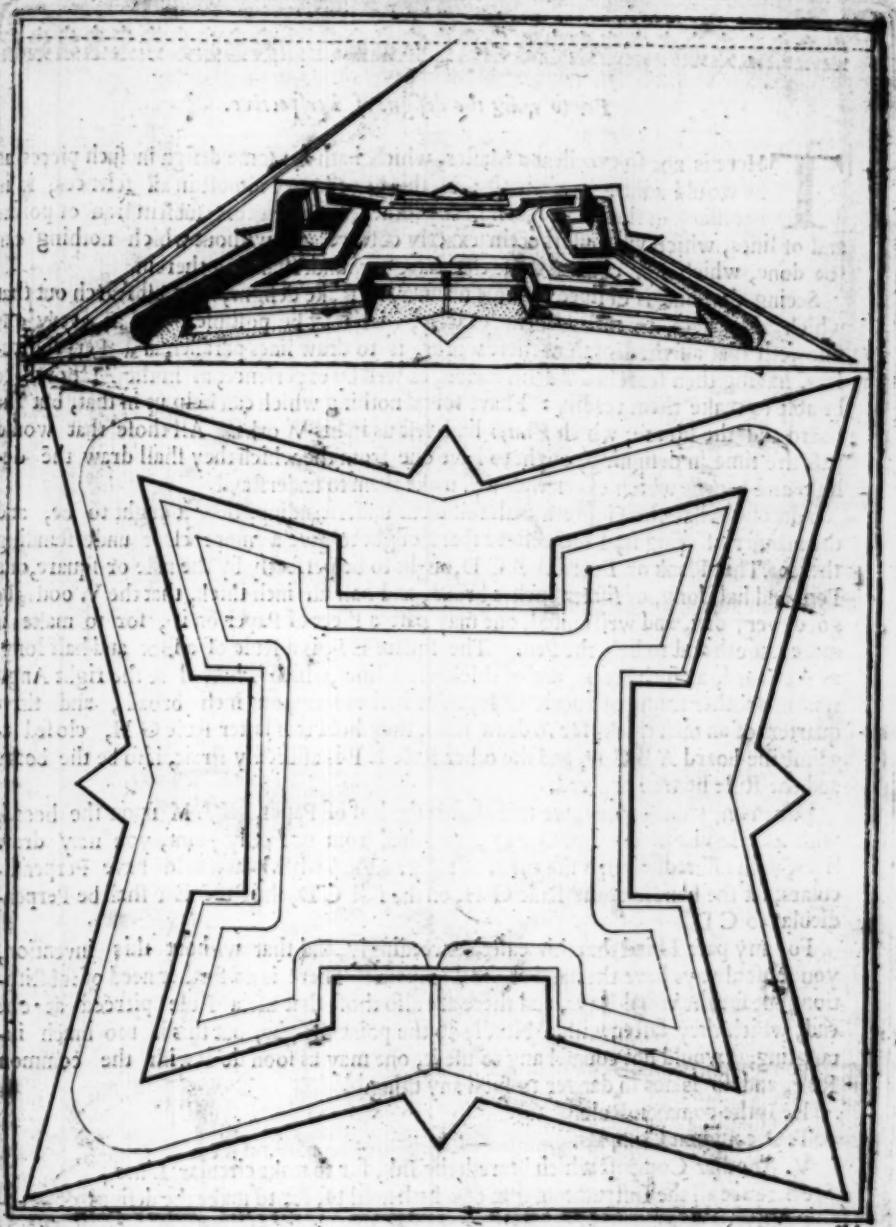

A
C
B
C
D
E
I
H
F
G

For to elevate and set in Perspective Fortifications.

I Will not repeat here the Order of Abridging, and setting the Planes of all sorts of Fortifications in Perspective; that which we have spoken thereof fol. 39. is plain enough.

For to elevate them, there is no more difficulty then in one single wall; but there needs more time by reason of the multitude of Angles, which we must always bring to the line of Elevation, for to take there the heights, that they ought to have, so as we have said elsewhere many times, speaking of other Works.

The little line of elevation is divided into four Parts; The first from 1 unto 2 is the height of the Parapet of the way covered; from 2 unto 3 is the height of the Rampart; from 3 unto 4 is the height of the Parapet of the Rampart. And from 5 unto 1 is the depth of the Trench.



For to make the designs of Perspective.

THere is not so excellent a Master, which hath not some design in such pieces, as he would willingly attain to: If this be ordinary almost in all sciences, it is necessary in this, more then in any other, by the great substitution of points and of lines, which we must therein exactly observe, and without which nothing can be done, which may content those that have any understanding therein.

Seeing that one is obliged in some manner, to make designs, we must search out that which may help to make them exactly, that may be possible: and as every one knoweth that all the length of these works, is to draw lines parallel, and Perpendiculars, having then searched the Invention, as well by experience, as in the Authours, to be able to make them readily: I have found nothing which can help us in that, but the board and the square, which *Viator* hath left us in his Works. All those that would pass the time in designing, ought to have one from the which they shall draw the delight and benefit which experience will make them to understand.

Although that the Figure giveth sufficient understanding, how it ought to be, and the manner of using it, I did believe that I ought to give a more clear understanding thereof. This Plank or Board A B C D, ought to be perfectly by the rule or square, of a Foot and half long, of fifteen inches broad, and half an inch thick, that the Wood be good, very dry, and well united, one may past a sheet of Paper on it, for to make it more smooth and to help the Pen. The square E F, is a Rule of a foot and half long, as the board, an inch broad, and of thickness 2 lines, which is helved at the right Angle within another frame of a Rule G H, eight inches long, one inch broad, and three quarters of an inch thick; for to draw lines, they hold this latter Rule G H, closed against the board A B C D, and the other Rule E F is assuredly strait, if so be the board and the Rule be well ordered.

When one would work, we must fasten the leaf of Paper I K L M upon the board, with 4 little bits of Wax N O P Q, and then from one only point, you may draw lines, with assuredness that they will be right. And when you would have Perpendiculars, set the handle of the Rule G H, on the side C D, the Rule E F shall be Perpendicular to C D.

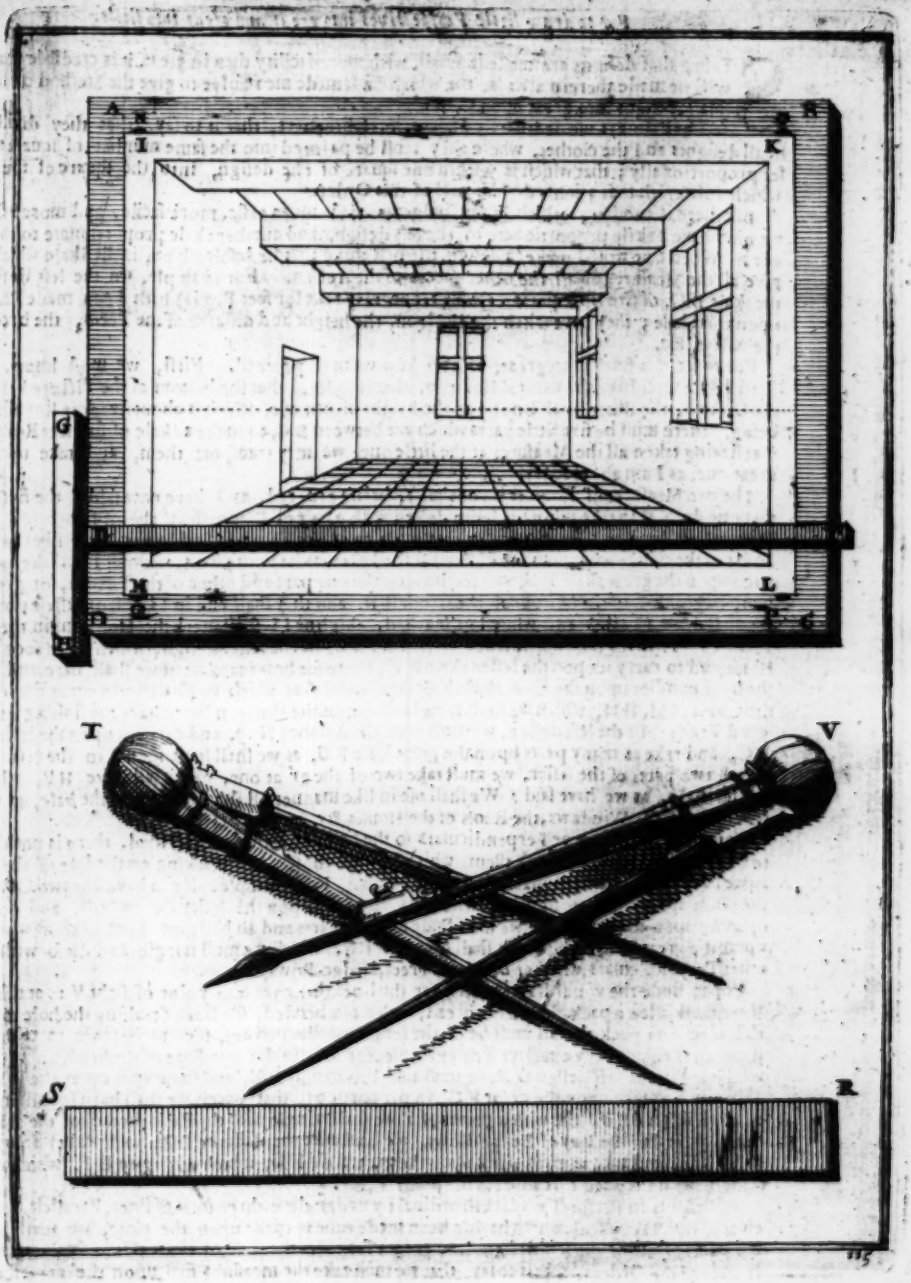
For my part I find that this easeth exceedingly, and that without this invention, you must always have the hand at the Compass. There is no further need of substitution, but for the visual Rays, and there are also those that use a Rule pierced at one end, which they fasten with a Needle to the point of sight, but this is too much intangling, I would not counsel any to use it, one may as soon do it with the common Rule, and so is not in danger to spoil any thing.

R. Is the common Rule.

T. A common Compass.

V. Another Compass which beareth the Ink, for to make circular Lines.

See here are all the Instruments that one hath need of, for to make the designs of Perspective.


A
B
I
K
G
M
L
T
V
S
R

For to draw little Perspectives into great, and great into little.

SEeing that designs are made in small, with more facility then in great, it is credible that they will be made therein always, the which hath made me resolve to give the Method of setting small designs into great upon Cloth.

The Painters use ordinarily Squares or Checquers, that is to say, that they divide the small designes and the clothes, where they must be painted into the same number of squares, and set proportionally; that which is within one square of the design, into the square of the Cloth which answereth to it; some do like well of this Order.

But here is another, which in my judgement, is more easie, more facile, and more assured; we must have a skale proportionate to the less design, and another skale proportionate to the bigger. When one would make a design, the first thing that he resolveth on, is the skale which must give all the Measures of all the other pieces of the design. For example, in the less design A, the skale B C, of five little parts, (which one may take for feet Royal) hath been made the first upon this skale; they have taken the Horizon, the height and distance of the Trees, the bredth of the Alleys, &c.

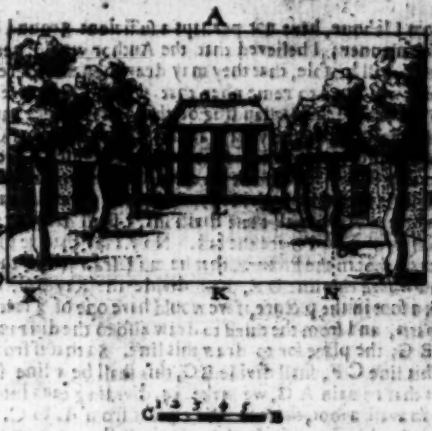
For to set this small into great, observe how we must proceed. First, we must know, if the Perspective must have the natural Horizon, that is to say, that the bottom of the Picture being on the Ground, the Horizontal line be at the height of our eye, which is about five feet Royal; This being, there must be five little parts which are between B C, to make a skale of five feet Royal F G, that having taken all the Measures at the little one, we may transport them, and take upon the great one, as I am about to say.

The two Measures of Proportion or skales, being ordered, as I have now said; the first thing that one doth, is to take upon the lesser design with a pair of Compasses; the distance of the base D unto the Horizon E, and to carry this opening of the Compas D E, upon the lesser skale B C, and to take notice what number of Parts it shall give, as he doth give 5, we must then take as many parts upon the great skale F G, and set them on the one part and other of the Picture, or great Design, beginning at the bottom of the Cloth H H, and they shall end in I I; from these points I I we must draw a Packthread whited or blacked, this line I I shall mark the Horizon in the great Picture; Then to take the distance or sinking K L, of the lesser design, which is the foot of the House; and to carry it upon the lesser skale B C, for to see how many parts we shall have, and to take the same number upon the great skale F G, and to set that which we shall finde upon the edge of the Cloth H M, H N, which we must tringle about, as the Horizon for to have the sinking of the second Tree; In the less design, we must take the distance N O, and carry it upon the lesser skale B C, and take as many parts upon the great scale F G, as we shall have found in the less. N O giveth two parts of the lesser, we must take two of the great one, which will give H P, which we must tringle, as we have said; We shall use in like manner all the Parallels to the base, as are the other Trees, the Windows, the Roots of the Houses, &c.

For the Plumb lines or Perpendiculars to the base, it is the same Method, there is nothing but to change the side for to mark them, which is, that in stead of marking on the side of the Cloth, as we have done, we must mark above and below. For example, for to have the two Cotners of the house at bottom; we must take with the Compasses upon the lesser design Q R, and carry this opening upon the scale B C, we shall finde about 7 parts and an half; we shall take as many parts upon the great scale F G, which shall give H S T S, which we must tringle and do so with all the other Perpendiculars, whether building Trees, Hedge-Rows, &c.

For to finde the visual Rays, which are the lines that go to the point of sight V: at this point V we must fasten a pack-thread or thread, with a pin bended, for fear of making the hole too great, this thread or pack-thread must be of the length of the Picture, for to be able to tringle and draw all the Rays very exactly; For example, for to have the two Rays of the bredth of the Trees, which are in the less design D X, we must take this design D X, and to carry it upon the lesser scale B C, and to take upon the great F G, in proportion to that which we shall have found in the less which will give H Y, the which points H Y we shall tringle with the Pack-thread of the point V; for to have also the Ray of Hedge-Rows, we must take the diffance D Z, and carry it upon the scale B C, and take as many parts upon the great scale F G, which will give H I, which we must tringle with the pack-thread from the point V, &c.

All that is in Perspective falleth ordinarily under these three sorts of lines, Parallels, Perpendiculars, and Rays visual, which having been made easie to make upon the cloth, we shall less fear the pains of setting the less designs into great; for to set the designs of great into small, we must only change the Orders, that is to say, that we must take the measures first upon the great scale, and diminish them proportionally upon the less, as if the Horizon of the great design were of 5 parts of the great scale. I would take 5 parts of the lesser scale, for the height of the Horizon of the less design, and so of all the rest.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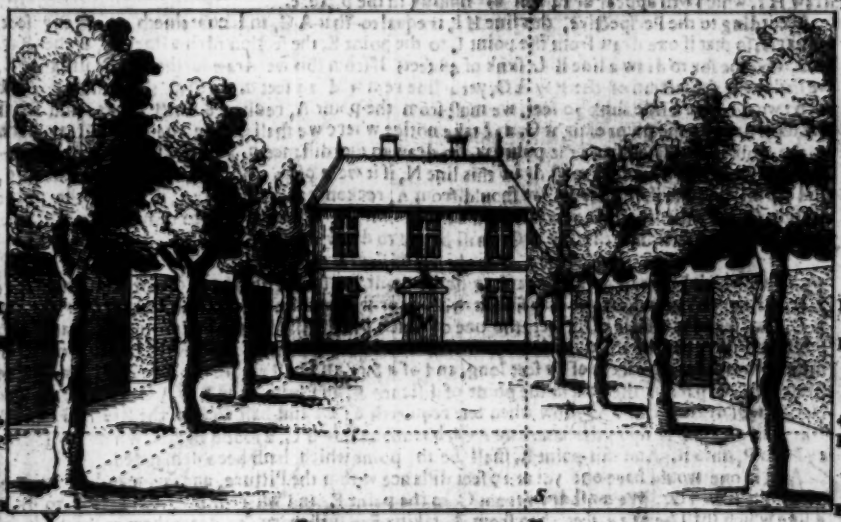
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Orders to facilitate the Universal manner of the Sieur G. D. L.

AS all those for whom I labour, have not perhaps a sufficient ground for to be clear into this order, or Universal manner; I believed that the Author would permit me to make it easie to them, as much as I shall be able, that they may draw benefit thereby. Wherefore I shall set these two figures, which will cause to remember that which I have already said, in the 2. 3. 4. and 5. advice, which are for the understanding of this order, there having shewed to take all the measures upon the base, and that as many Rays as divide the Diagonal C, are as many small squares in the sinking of the picture [illegible] such a greatness as they will.

That we may not go to seek so far, [illegible] the first figure where the base is A B, the point of sight G, the points of distances E F, I divide this base into 12 equal parts; each of which I shall make to be about a foot, and from all these divisions, I shall draw to the point of sight, which shall be as many Rays, whereof A and B are the last. Now I say that he that would have a line, which should appear sunk a foot in the Picture, that he must draw from the first division B D to the point of distance F, and where this line D F, shall divide the Ray B G, that shall be the point for to draw the line sunk a foot in the picture, if we would have one of 3 feet sinking, we must take upon the base 3 of these parts, and from the third to draw also to the distance F; and we shall have at the section of the Ray B G; the place for to draw this line. So that if from the point C, we draw to the point F, where this line C F, shall divide B G, this shall be a line sunk of 6 feet,

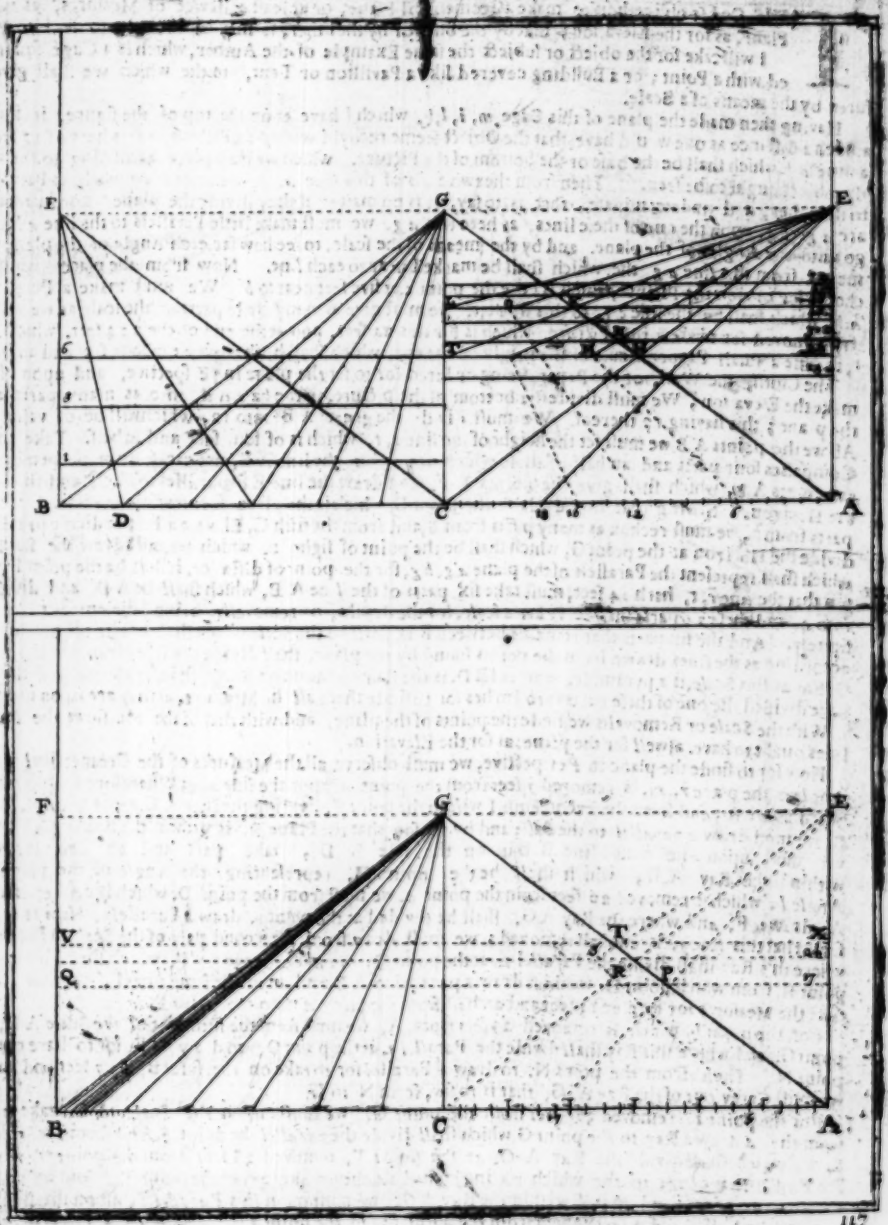
If of the other 6 parts that remain A C, we make 24, dividing each into 4, and that we leave not to make each part to avail a foot, there will be 24 feet from A. to C. In such manner as if we require a line; which should appear sunk 18 feet in the Picture, I should reckon from A, 18 little parts, and from the 18 I would draw to the distance E, which would give me by the section of the Ray A G, the point for to draw this line; if one would that it should be sunk 24 feet, we must take A C, and draw from C, to E, and where this line should divide A G, at the point H, we shall draw H I, which will appear of 24 feet of sinking in the picture.

According to the Perspective, this line H I, is equal to that A C, and containeth as many feet or parts, so that if one draw from the point I, to the point E, the section of this line I E, at the Ray A G, shall be for to draw a line K L sunk of 48 feet; If from this we draw further to the distance E, we shall have the section of the Ray A G, yet a line removed 24 feet more then the others. And if one would have a line sunk 30 feet, we must from the point A, reckon 6 small parts, and from the sixth draw to the point of sight G, and take notice where we shall divide the line H I, as here at the point M. Then from the point M, to draw to the distance E, and this line M E, shall divide the Ray A G, where we must draw this line N, if it were of 40. We should from A, reckon 16, and do all the same if, it were 60, we should from A, reckon 12, and from 12, draw to the point of sight G, unto the line K L, which should be the point O, Then from O, to draw to the distance E, and from the section of the Ray A G, shall be for to draw this line.

For the second figure.

BY that which I have spoken, it is easie to find a point for such a sinking as one would have, There remaineth to shew how we may find it within, or without the Ray A G, or B G, for this the line B C, shall serve as a scale of six feet, the one of which I shall divide into twelve inches, that I may there find the half, the third, and the 4th of a foot. All being thus ordered. If one require of me a point which appeareth of 17 feet long, and of a foot and half within the Ray A G, I will draw from the 17th part of the base to the point of distance E, and where the Ray A G, shall be divided in P, I will draw a line P Q, now when one requireth a foot and half within the Ray A G, I will take with a Compass upon the same line P Q, but on the side B C, a foot 6 inches, which I will carry from P, unto R. And this point R, shall be the point which hath been demanded.

And if one would have one yet at 29 feet distance within the Picture, and seven and an half beyond the Ray A G. We must draw from C, to the point E and where it shall divide A G, to draw a line which shall be of 24 feet, then from A, taking five little parts, to draw them to the point of sight G, until that we divide this line at the point S, and from this point S, to draw to the distance E Where the Ray A G shall be divided, we must draw a line T V, seeing they require 7 feet and an half beyond the Ray A, we must upon the same line T V, but on the side B C, take 7 parts and 6 inches with a Compass, and carry them from the point T, to the point X And this point X, shall be the point that one desireth, And so of all others, at such a distance and removal, as one would have.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Of a general manner for to exercise Perspective, without setting the Point of distance out of the Picture, or Field of the Work by the Sieur G D L.

THIS Order obligeth us to make a Geometrical Plane, or at least a device of Measures, as well for the Plane, as for the Elevation; that by the one, or by the other, it may be brought to set into Perspective.

I will take for the object or subject the same Example of the Author, which is a Cage squared, covered with a Point; or a Building covered like a Pavillion or Tent, to the which we shall give the Measures by the means of a Scale.

Having then made the plane of this Cage, *m, i, l, k*, which I have set on the top of the figure, it must be, that at such a distance as one would have, that the Object seeme recoyld within the Picture, as it is here of 17 feet; we make a line *a b*, which shall be the base or the bottom of the Picture, which we shall place according to the aspect, that the object ought to be seen. Then from the two ends of this line *a, b*, we must draw two lines Parallels the one to the other, and undeterminate, that is to say, it is no matter if they divide the plane, nor in what place, as are *a g, b g*, upon the one of these lines, as here this *a g*, we must make little Parallels to the line *a b*, which may go unto the Angles of the plane, and by the means of the scale, to see how far each Angle of the plane shall be removed from this line *a g*, the which shall be marked near to each line. Now from the place which one shall choose for to view the Picture, which is the point *c*, at five feet near to *b*. We must make a Perpendicular to *a b*, which shall be the line *c t*, to this line *c, t*, we must give as many little parts of the scale as we would have to be removed for to view the Picture, which is for this 24 feet, and at the end of these 24 feet, which is the point *t*, to raise a small Perpendicule of the height of the eye, which shall be the line *c t*, of four feet and an half.

The Cloth, the Wall, or the Paper, being ordered for to set the plane in perspective, and upon the plane to make the Elevation; We must divide the bottom of the picture, or the base A B, into as many parts as that *a b* of the plane; this having 12 thereof. We must divide the great A B into 12, which will be of value each a foot. Above the points A B we must set the height of the line *s, t*, which is of four feet and an half. Take then with the Compasses four parts and an half of those which are upon the line A B, and carry them perpendicularly upon the points A B, which shall give the points E F, and draw the line E F parallel to A B, and this line shall be the Horizon. Seeing that in the plane the point C, which is the place for to view the Picture, is removed five parts from *b*, we must reckon as many parts from B, and from the fifth C, Elevate a Perpendicule to A B, which shall divide the Horizon at the point G, which shall be the point of sight, to which we must draw the Rays A G, B G, which shall represent the Parallels of the plane *a g, b g*, for the point of distance, it shall be the point F, and by reason that the line *c, t*, hath 24 feet, must take six parts of the line A B, which shall be A D, and divide them each into 4, and these 24 parts shall serve for a scale, for the depths, or removalls; being sufficient for to set them out infinitely. And the six parts that remaine between B D, shall be the Scale which shall furnish the Measures of the feet according as the lines drawn from the points found by the plane, shall divide the Rays drawn to the point of sight G; For as this Scale, is a pyramide, whereof B D, is the Base the Measures diminish in proportion as they are sunk. I have divided the one of these parts into Inches for to finde there all the Measures, as they are upon the plane.

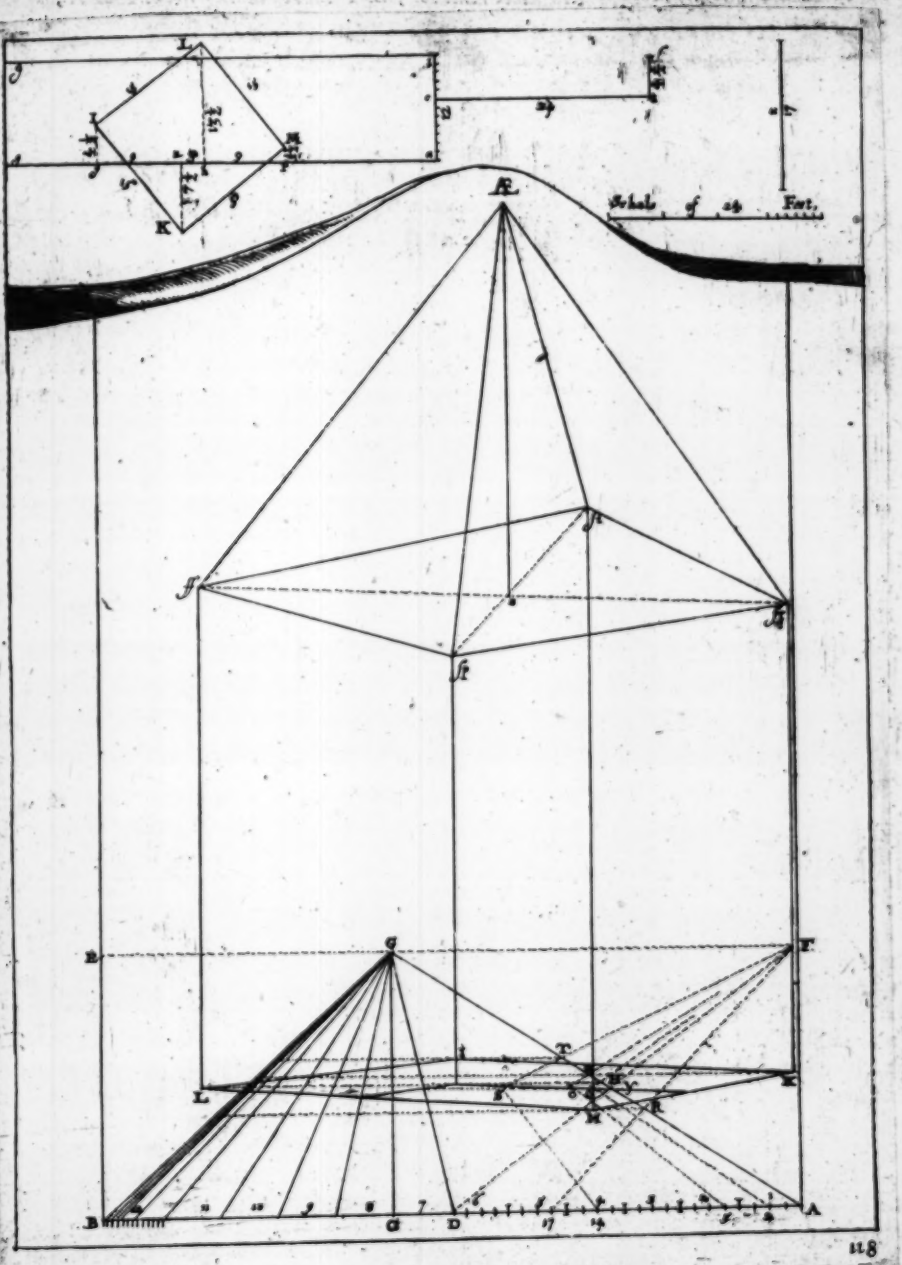
With the Scale or Removalls we finde the points of the plane, and with that of the Measures the length that the lines ought to have, aswell for the plane, as for the Elevation.

How for to finde the plane in Perspective, we must observe all the Measures of the Geometrical plane the first Angle of the plane *r, m*, is removed 7 feet from the point *a*, upon the line *a, g*; Wherefore I will reckon 17 parts beginning at A; and from the seventeenth, I will to the point F, dividing the Ray A G, at the point R, from this point R, we must draw a parallel to the Base; and by reason that the Plane *m*, is within the Ray *a g*, a foot and an half, we must upon the same line R but on the side B D, take part and an half for to carry it within the Ray A G, which shall be the point M, representing the Angle of the plane M; for the Angle *l*; which is removed 26 feet from the point *a*, we must from the point D, which is 24 feet from the point A, draw to F, and where the Ray A G, shall be divided at the point *y*, draw a Parallel. Now as it is about two feet, that this line *y*, is enough removed; we must draw from the second part of the Scale to the point G, and where this Ray shall divide the Parallel *y*, at the point Q, we must draw Q F, which shall give upon A G, the point H, from which point H, we must draw a parallel to A B, and upon the same line H, but on the side B D take the Measure for to give 13 feet and an half from the point H unto the point L.

For the point *k*, which is removed 29 feet from A, we must from the fifth part of the Scale A D, draw to the point G, and where this Ray shall divide the Parallel *y*, at the point O, to draw O F, for to have upon A G, the point N. Then from the point N, to draw a Parallel for to take on the side B D, 7 feet and an half, which we must carry out of the Ray A G, that is to say, from N to K.

For the point *i*, removed 38 feet from the point *a*, we must upon the Scale A D, take 24 parts, and from this draw a Ray to the point G, which shall divide the parallel the point S. And from the point S, to draw to F, which shall divide the Ray A G, at the point T, removed 38 feet from the point A: by reason that the Parallel *y* is of 24; to the which having joyned 14, they make 38. at the point T. And by reason that the Angle *i*, is 4 feet and an half within the Ray A G, we must upon this Parallel T, but on the side D B, take 4 feet and an half, and Carry them from the point T; to the point I.

For to frame the plane we must joyn by right lines, these 4 points M L K I, and from these Angles raise perpendicules as M, *ff*, L, *ff*, K *fr*, and I, *sp*. The which shall have each 17 feet, as is marked in the plane by the line X, and from the ends of these perpendiculars, to draw two Diagonals *ff, sp, ff fr*, which shall divide themselves in Z, and upon this point Z, to elevate a perpendicular Z Æ. of 13 feet and an half. Then to draw lines from all the four corners *ff ff sp*, and *fr*, to the point Æ, and the Cage shall be framed in perspective. If one would that it were found within the ground one foot, we must adjoyn one foot under every point of the plane; and joyn them together with lines.


Scale of 24 Feet.

For to give juſtly the diſtance removed, the Point remaining in the Picture.

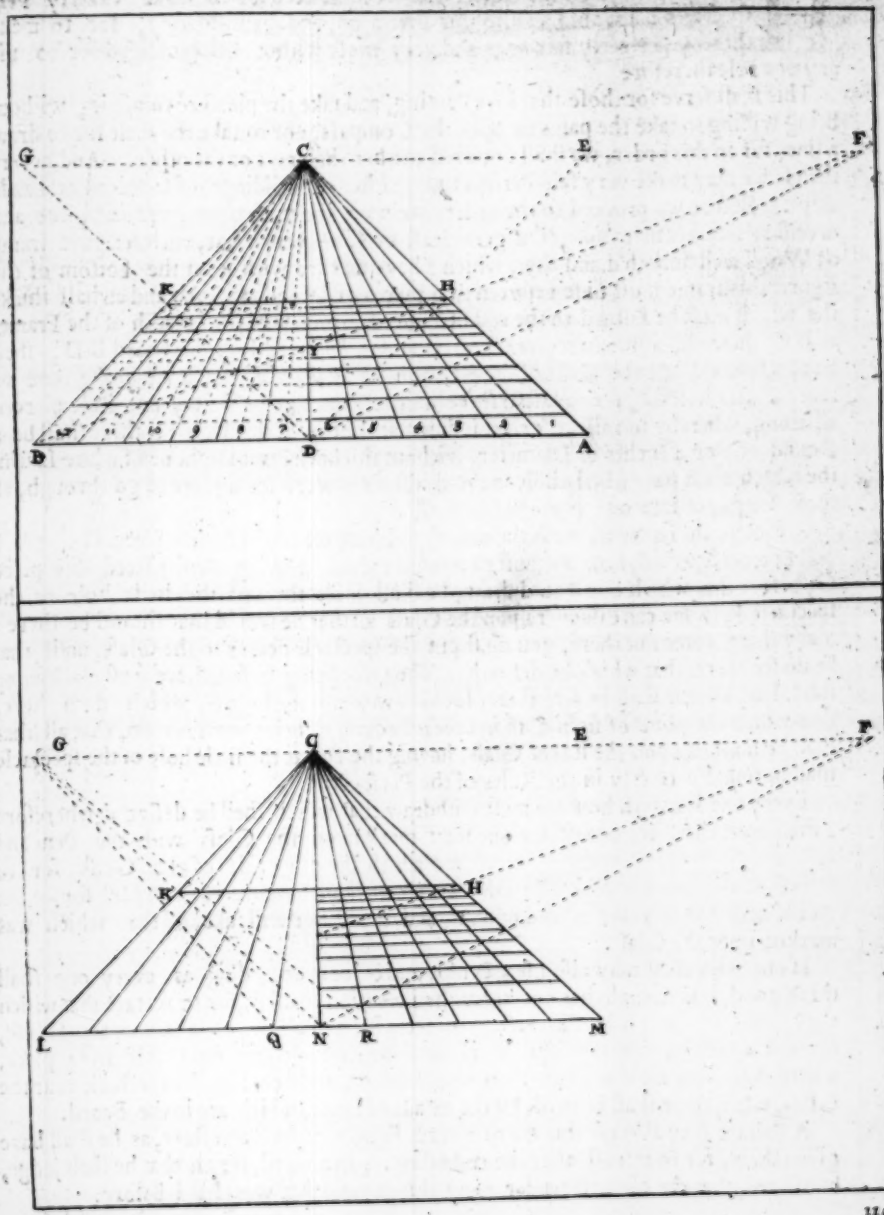
THoſe that would uſe this common manner muſt know, that the number of feet that we ſhall take upon the baſe, ought to have reſpect to the diſtance that they ſhall have determined of. For to cauſe my Propoſition to be underſtood, I will ſet in the firſt figure two diſtances, the one of ſix feet, the other of twelve, which have reſpect the one to the other, by reaſon that dividing into two each of the ſix parts, we ſhall have twelve.

Let us ſuppoſe then that the line A B is divided into twelve parts, and that from all theſe parts, one hath drawn Rays to the point of ſight C, let us take now the half of theſe diviſions A D, and draw to the point E, which is the diſtance of 6 feet; it is certain that the ſection of the Ray A C, ſhall be the abridgement of the ſquares view'd ſix feet diſtant. If from the point D we draw to the point F, which is the diſtance of twelve feet, this line D F dividing the Ray A C, ſhall give the abridgement of ſix little ſquares view'd twelve feet diſtance. He that would have the abridgement of twelve ſquares, view'd twelve feet diſtant, he muſt from the point B, which is the whoſe baſe, draw to the point F, and at the ſection of the Ray A C to the point H, ſhall be that which is required: or elſe from the point I to draw I F, which ſhall give the ſame point H, and the line H K ſhall be ſunk twelve little ſquares viewed at 12 feet diſtance. We ſee in this that 12 little ſquares viewed at 12 feet diſtance, do meet in the ſame line H K, that ſix ſquares viewed at ſix feet diſtance, and all the lines of ſix ſquares, that the ſection of the Diagonal D G hath given, do reflect themſelves by two and two to thoſe, which the Diagonal D F hath given, the reaſon why the Diagonal D F hath given two lines for one of thoſe D G, is that the diſtance is doubled. If it were trebled it would give three, and four if it were four-fold. Now for to finde on the ſide B D, the ſame ſections, and the ſame number of little ſquares, as on the ſide D A, without the point of diſtance be out of the picture, we muſt only divide into two each of the ſix equal parts which are between B D, which will make 12 parts, and from their diviſions to draw occult lines to the point of ſight C; and if one draw Parallels to the baſe, by all the ſections that the Diagonal maketh of all theſe Rays he ſhall have 12 ſquares of ſinking in the ſame line, and if the diſtance were of twelve feet, although that G be but ſix feet of diſtance: the reaſon of this is, that by multiplying the Rays we multiply the ſquares, and multiplying the ſquares we remove the diſtance: ſee then how having made twelve parts of ſix, which were between B D, there ariſeth twelve little ſquares, which make the ſame ſinking that the diſtance at twelve feet diſtant. And he that would have the diſtance at 24 feet, he muſt divide ſtill into two, each of the parts between B D, which would make 24 parts, and from the 24th. to the point D, to draw the line D G the ſection that it would make of the Ray B C at the point K, would be the ſinking of the 24 feet.

In the ſecond figure, I have ſet upon the line L M the ſame Meaſures as upon A B of the firſt figure, and on the ſide M N, the ſame ſinking, and the ſame diſtance as on the ſide A D, which giveth the line H K, to the end that we may ſee, that he which would draw the fifth part, as Q G, or from the ſeventh as R G, that he ſhould not have the true ſinking which is at K: for R G would not ſink enough, and Q G would ſink too much, although from theſe 5 or 7 parts, there would be made twelve or twenty four.

Wherefore we muſt obſerve to take always a Number, which may be multiplied by the diſtance, as here the diſtance of ſix may ſerve for 12, 18, 24, 30, 36, 42, 48. and ſo an infinite number by ſix. The diſtance of 5 may ſerve for 10, 15, 20, 25, 30, &c. The diſtance of eight, may ſerve for 16, 24, 32, 40. 48, &c. We cannot fail doing thus, for ſuppoſing that the point of diſtance could not be nearer to the point of ſight then G is near to C, it followeth that if G is at 6, at 7, 8, or at 10 feet from the point C, that the half of the baſe hath the ſame number, the which number we muſt divide proportionably to the removal, which we will give it. For example, if there be eight feet from N to L, and that I would have the diſtance of 32 feet without that G go out from his place, I will divide each of the eight parts, which is the half of the baſe as L N into 4, and 4 times 8 will be 32 Rays, ſo the abridgements of the ſquare ſhould be at 32 feet of diſtance.

All theſe little diviſions remain not after the Picture is made, there are none but the principal diviſions of feet, which they draw to the point of ſight, and the abridgements, that is to ſay, the Parallel to the baſe which remain always.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A very fine Invention, for to make naturally Perſpectives without keeping the Rules.

HAving ſet down all the Rules, that we muſt keep for to make exactly Perſpectives: I would ſet alſo this Invention, and the following, for to make thereby perfectly fair ones and very exact without being obliged for to uſe any one rule therefore

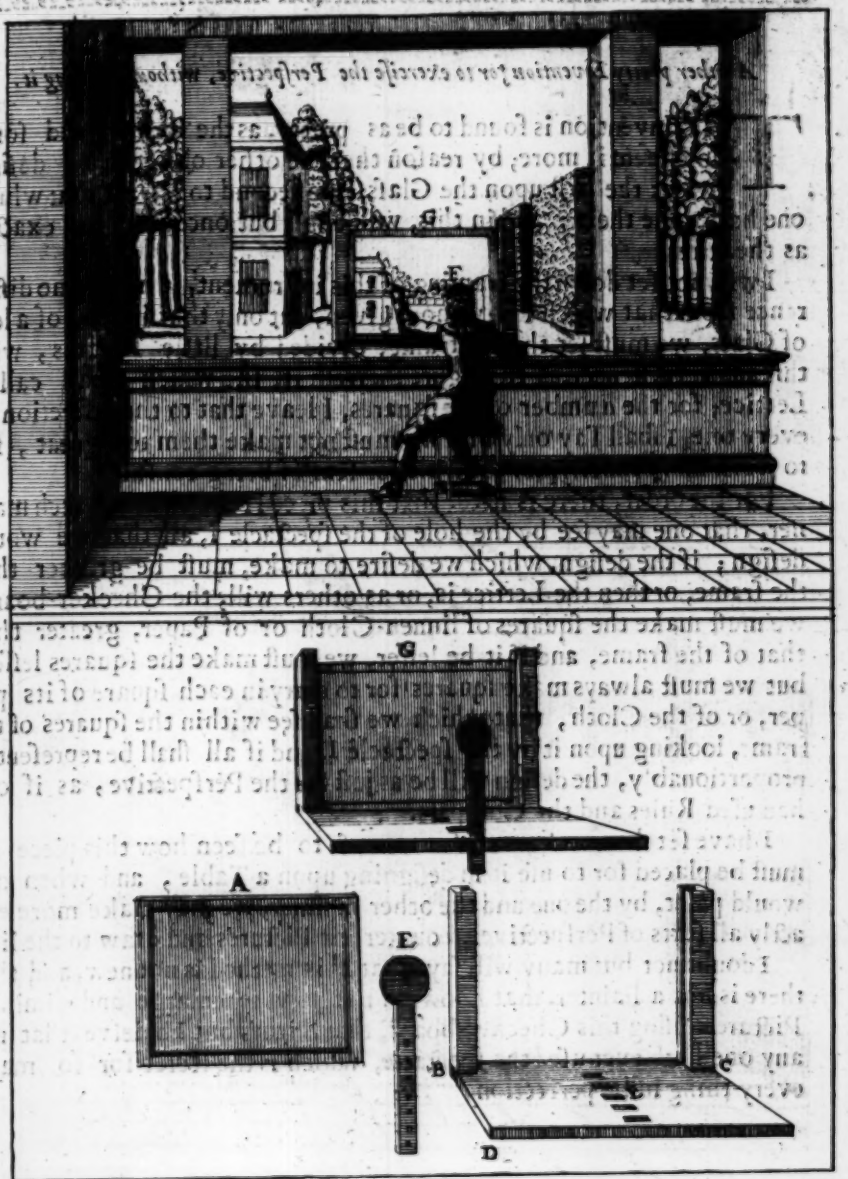
This ſhall ſerve for thoſe that love Panting, and take the pleaſure to uſe it; without being willing to take the pains to open the Compaſs, nor to take the Rule for to draw a line; for in this order, we ſhall not need neither the one nor the other. And nevertheleſs we may make very fair Perſpectives, either of Buildings, of Gardens, or Landskips. Before we proceed to the order, we muſt know, that the principal piece and neceſſary for this invention, is a great leaſe of Glaſs very clear, encloſed in a frame of Wood well ſmooth'd and thin, which I have marked with A: at the bottom of the figure, this frame muſt ſlide between two pieces of Wood, an Inch and an half thick, the which muſt be faſtned to the end of a board, which is of the breadth of the Frame, as B C ſheweth, fit for to receive the Frame A. The breadth of this board B D, ſhall be of a foot C. At the midſt of the fore-part of this board, we muſt make one or more ſquare holes E, for to faſten there a little Iron Rod or Wire, as a Rule pierced all along, whereby to raiſe it, or let it down at the top of this Rule F, there ſhall be a Round of 3 or 4 Inches of Diameter, without thickneſs, as it might be of white Lattin, the which muſt have a little hole in the midſt, as it were for a piece to go through, all theſe things put into one, make the piece G

Although the figure ſheweth the order, and how we muſt uſe this piece G, yet I will not ceaſe to tell, how we muſt proceed therein. Having then placed this piece G, before that which one would draw, he ſhall look through the little hole of the ſpectacle F, if one can diſcover upon the Glaſs all that he would that ſhould be there: if any thing come not there, you muſt put the ſpectacle nearer to the Glaſs, until that he do ſee there, that which he deſireth The piece being ſo ſetled, we muſt mark upon the Glaſs, all that ſhall be ſeen there, looking through the hole F, which doth here, that which the point of ſight doth in other Orders, it being moſt certain, that all that ſhall be marked upon the leaf of Glaſs, having the eye at the little hole of the ſpectacle ſhall be found perfectly in the Rules of the Perſpective

Every one knoweth how we muſt withdraw that which ſhall be deſigned; wherefore I ſhall leave that, for to ſay that one may mark upon the Glaſs with the Pen and Ink. and after that all is done, to moiſten a little the other ſide of the Glaſs for to refreſh the Ink and to ſet on the ſide, which we ſhall have traced, a Paper ſomewhat moiſt, and then to paſs the hand upon it; and the Paper will take, all that which was marked upon the Glaſs.

If one will, they may alſo uſe a Penſil, and colours according as every one ſhall think good, it is enough that one know the invention to uſe it, for to retract that which they will: For it is as eaſie to retract a Pallace as a Country-Houſe, or a Chamber, ſeeing that it is nothing but to ſet ones ſelf in a place, where there may ſee that which they would deſign, and to bring the ſpectacle near the Glaſs, when there ſhall be need, by the means of holes, which are in the Board.

A Painter may alſo uſe this for to retract figures, at ſuch a poſture, as he ſhall have given them, for to retract after the emboſſing. In a word, for all that he ſhall judge, be aſſured, that the uſe will render many things eaſie that were hard before.



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Another pretty Invention for to exercise the Perspective, without knowing it.

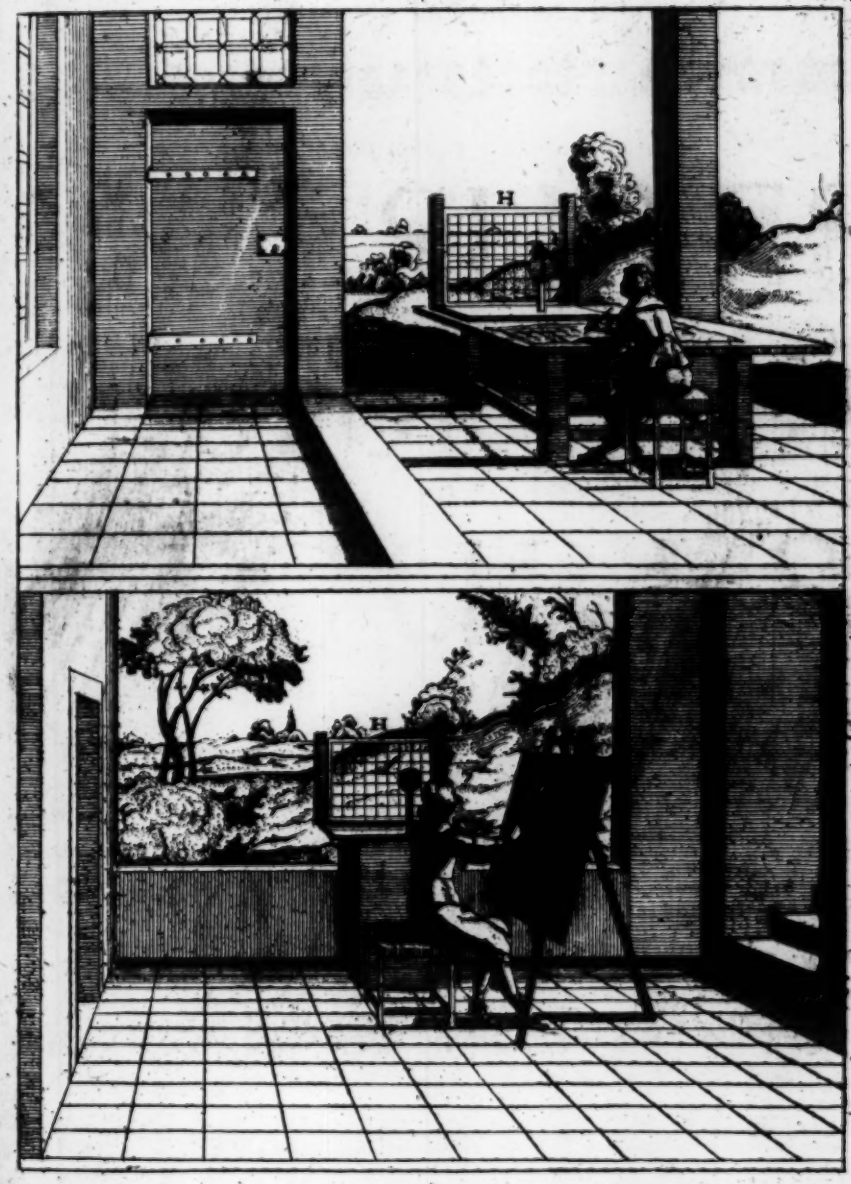
THis Invention is found to be as pretty, as the former, and some do esteem it more; by reason that the other obligeth to design twice: the first upon the Glass: the second to retract that which one hath done there: and in this, we design but once, and as exactly as the other.

I will not set down the framing of this instrument, it having no difference from that which I have now given, but only that instead of a leaf of Glass, we must set there a frame, divided by little squares, with threads very slender, as the figure sheweth it, the which I shall call a Lettice; for the number of the squares, I leave that to the discretion of every one, I shall say only that we must not make them too great, for to work more exactly, nor too little for fear of being confused.

For the order, there is need, that this piece H, be placed in such manner, that one may see by the hole of the spectacle I, all that we would design; if the design, which we desire to make, must be greater then the frame, or then the Lettice is, or as others will, the Checker-board, we must make the squares of linnen-Cloth or of Paper, greater then that of the frame, and if it be lesser, we must make the squares lesser, but we must always make squares for to carry in each square of its paper, or of the Cloth, that which we shall see within the squares of the frame, looking upon it by the spectacle I, and if all shall be represented proportionab'y, the design will be as just for the Perspective, as if one had used Rules and the Compass.

I have set the two figures, for to cause to be seen how this piece H, must be placed for to use it in designing upon a Table, and when one would paint, by the one and the other manner, we may make more exactly all sorts of Perspectives, counterfeit Pictures, and draw to the life.

I doubt not but many will say, that this method is not new, and that there is not a Painter, that knoweth not how to enlarge and diminish Pictures, using this Checker-board, that is true, but I beleive that not any one hath ever used the spectacle, which is the secret for to make every thing in its perfection.



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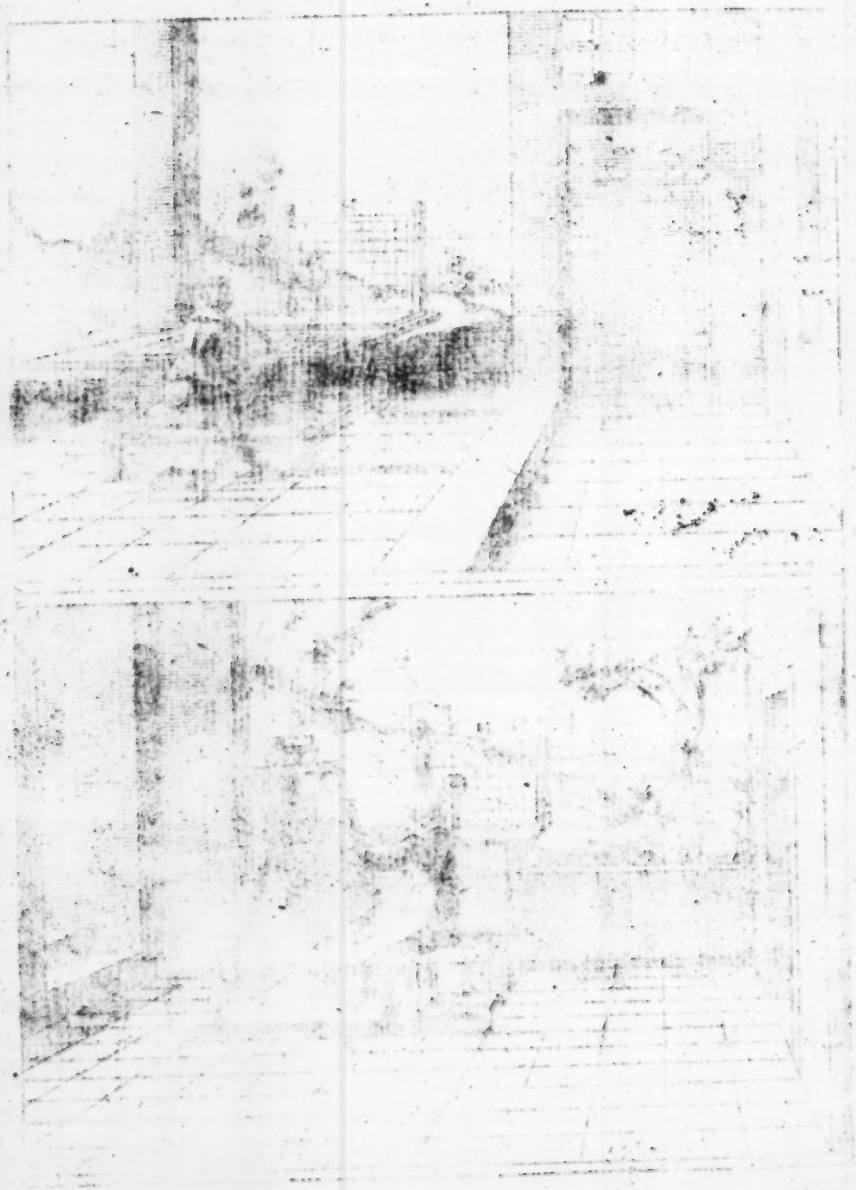
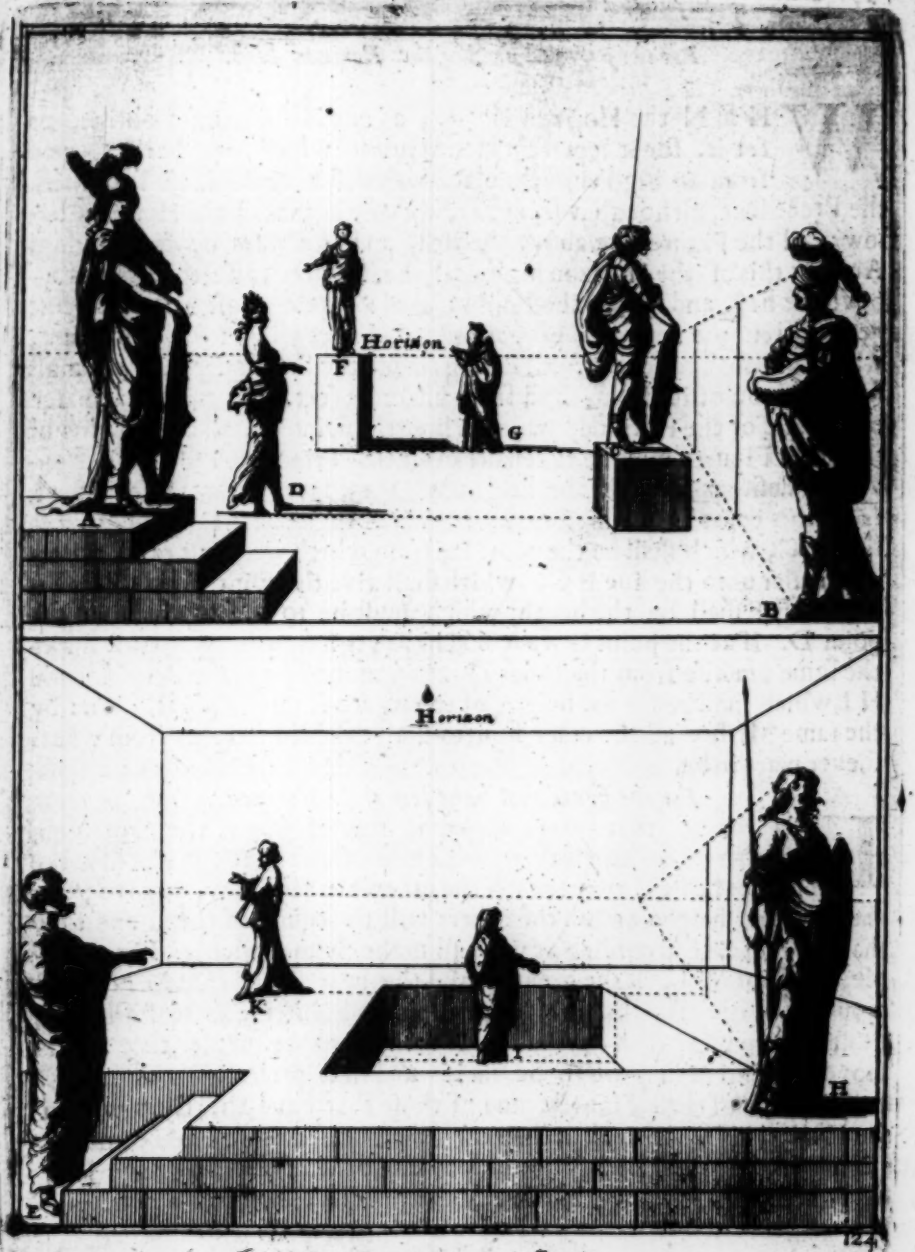


MEASURES
AND
PROPORTIONS
OF
FIGURES
IN
PERSPECTIVES, PICTURES,
AND
VVORKS EMBOSSED

Of Figures Elevated above the Plane.

THere are that ſay, that the Objects elevated from the Earth, have more diminution then when they were upon the Plane, and that for this reaſon, it muſt be that a Figure raiſed up 4 or 5 feet, ſhould be leſſer then if it were on the Ground: this ſhould be good if it were elevated very high, as we ſhall ſay hereafter; but this little maketh that the diminution is unperceiveable; for ſuppoſing, that ſuch an Object or Figure could be diſcovered at one only view, that is to ſay, without lifting up the eye; they ought to have the ſame height being elevated, as if they were on the Ground; For example, the figure A muſt have the ſame height that the figure B, and the figure C, as that of D, and that of F, equal to G, and ſo of others.

For the Figures below, we ſhall mark for the ſame reaſon, the Figures that are below are of the ſame height as thoſe above, as is the figure E, equal in height to that of H and I, as great as the figure K These two Examples ſhall ſerve for all thoſe that we could make there.


Horizon
F
G
D
B
Horizon
K
H
E
124

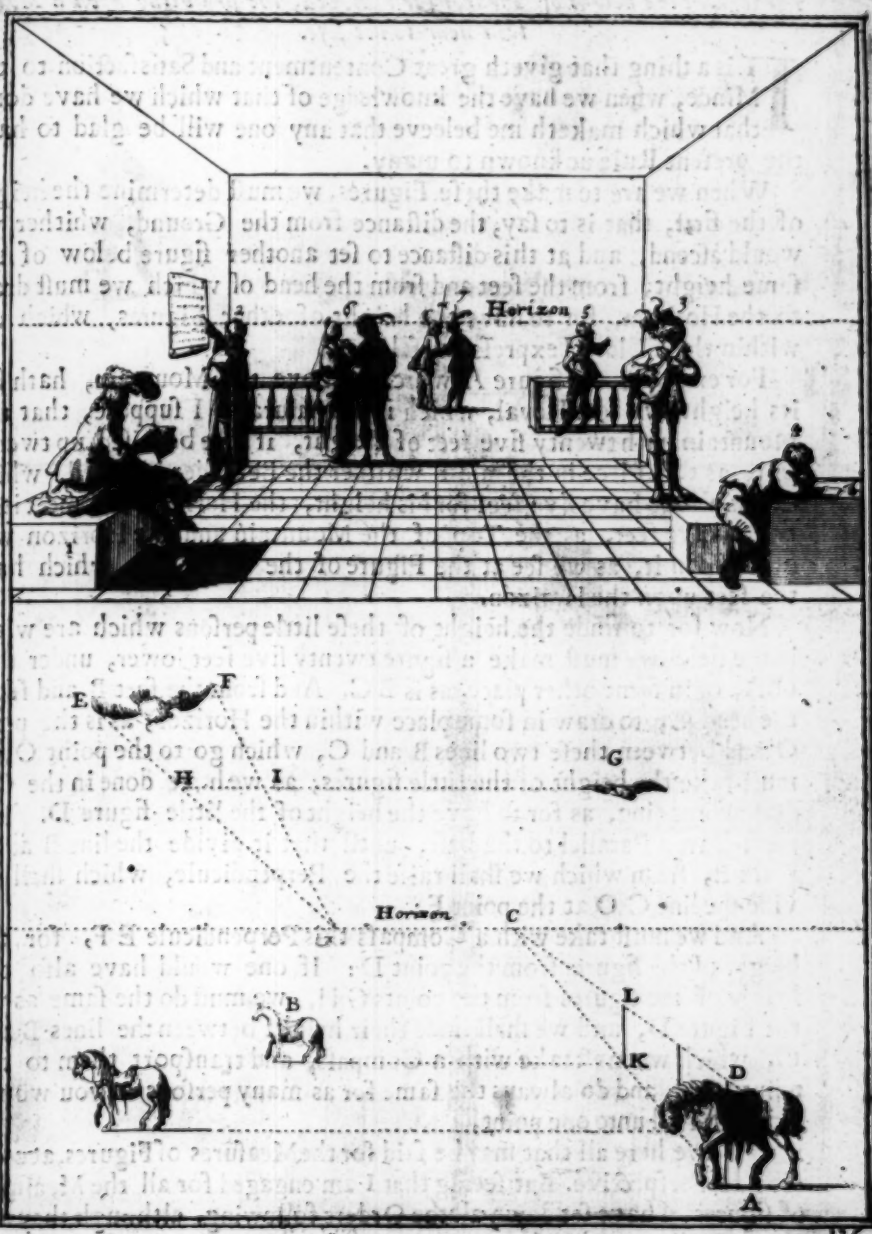
For the Figures having the Horizon high.

WHEN the Horizon is high, as one is ſometimes obliged to ſet it, for it repreſents ſometimes, which one hath viewed from an high eminent place, we muſt keep the ſame Rule with the Precedent, although it ſeem the contrary in that of the Horizon below: all the Figures are above the firſt, and go always by diminiſhing. And for this of the Horizon high, all the Figures raiſe themſelves above the firſt, and the furtheſt diſtant is always the moſt elevated, but nevertheleſs the leſſer in proportion, and according to the meaſure, which one ſhall take thus. Having made the firſt figure A B, we muſt from the top of its head, and from under its feet, draw in what place one would of the Horizon, which is here the point C; all the heights of the other Figures muſt be taken between this Triangle A C B. For example, deſirous to have the height of the Figure from the point D, from this point D we muſt make a Parallel to the baſe D E, unto the line A C, which ſhall be the point E, from which we muſt raiſe a Perpendicular unto the line B C, which ſhall give the point F this Perpendicular E F ſhall be the height which muſt be to the figure from the point D. If at the point G we would have yet a figure, you muſt make the ſame practiſe from the Point D, and you ſhall have the Perpendicule H I, which ſhall be for the height of the figure from the point G, And by the ſame Method all the other figures ſhall take the heights from whatſoever place it be.

For the figure that have feet at the Horizon.

IT is rarely that one maketh figures upon the Horizon, but if there were neceſſity, we muſt make thoſe that one would make appeare the firſt, greater then the other, that is to ſay, to give them the Natural height, and all the others will be equal to them, and they ſhall be removed according as we ſhall make them the leſſer: For example, the figure K L, is the greateſt and the neareſt and that M N, is the moſt removed: As the ſecret in this for the Painters, is to finiſh well thoſe before more then thoſe of the bottome, and the further they are removed, the more they are to be faint and leſs perfect.

The Rule of theſe Figures, and of thoſe that have the Eyes within the Horizon, is no other then their owne height, for as well in the one faſhion as in the other, there is but only to make the Figures leſſer and leſſe furniſhed, which we would have backward and ſeeme farther off.


Horizon
E
F
G
H
I
Horizon
C
B
L
K
D
A

For to finde the height of Figures far removed, the first being upon a Mountain near to the Eye.

IT is a thing that giveth great Contentment and Satisfaction to the Minde, when we have the knowledge of that which we have done, that which maketh me beleeve that any one will be glad to have the present Rule unknown to many.

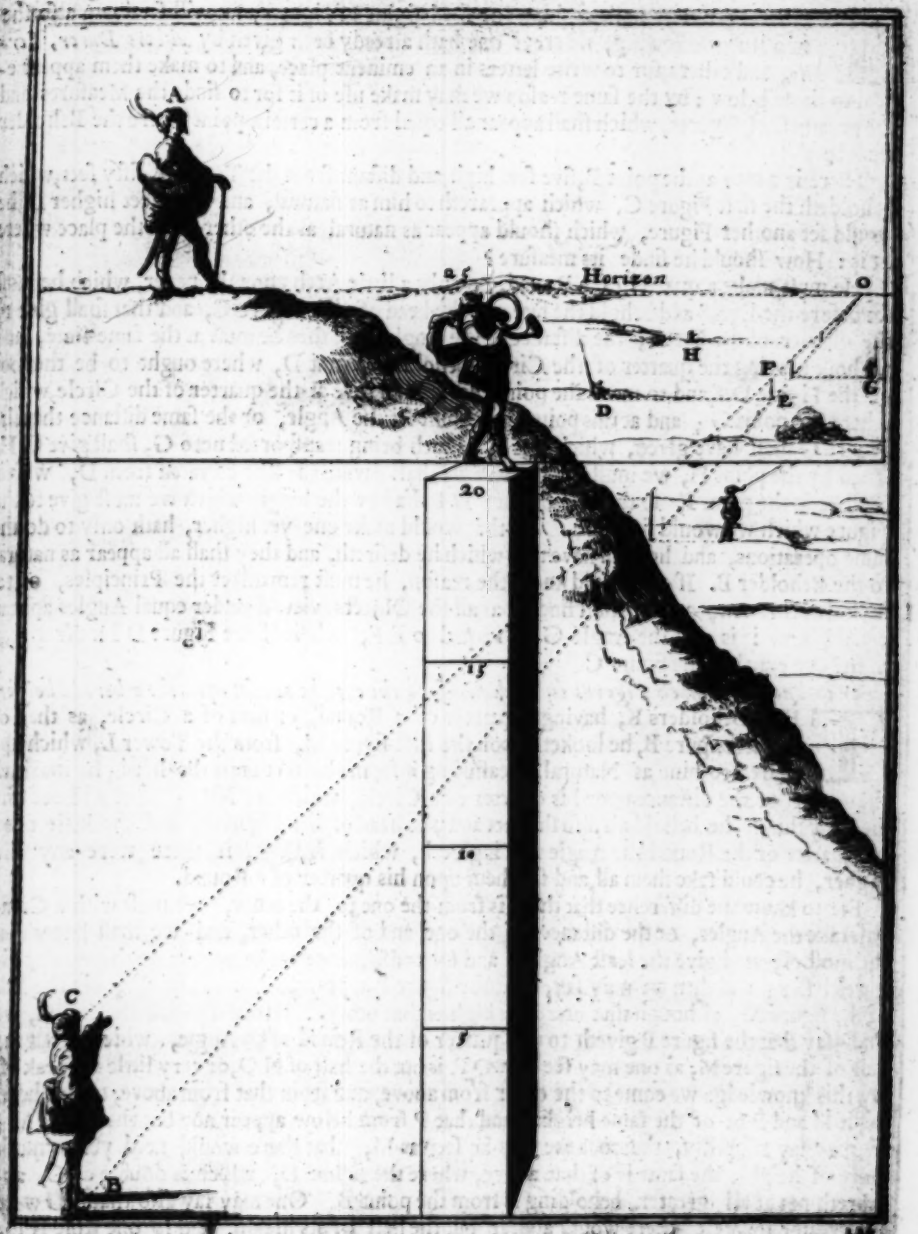
When we are to make these Figures, we must determine the height of the first, that is to say, the distance from the Ground, whither we would ascend, and at this distance to set another figure below of the same height, from the feet and from the head of which we must draw to the Horizon, for to have the height of other Figures, which are within the Field. I express my self.

For example, the figure A which is above the Mountain, hath for its height five feet Royal, which is the natural. I suppose, that the Mountain hath twenty five feet of height, if one be raised up twenty feet, as this Piece in the midst whither the Beholder is raised, which ought also to have five feet for his height, the Horizon will meet it at twenty five feet, as the Top of the Mountain and the Horizon will grate upon it, as we see at the Figure of the Mountain, which hath the feet upon the Horizon.

Now for to finde the height of these little persons which are within the field, we must make a figure twenty five feet lower, under that of A, or in some other place, as is B C. And from the feet B, and from the head C, to draw in some place within the Horizon, as is the point O, and between these two lines B and C, which go to the point O, we must take the height of the little figures, as we have done in the Orders aforegoing, as for to have the height of the little figure D. We must draw a Parallel to the base, until that it divide the line B at the point E, from which we shall raise the Perpendicule, which shall divide the line C O at the point F.

And we must take with a Compass this Perpendicule E F, for the height of the figure from the point D: If one would have also the height of the figures from the points G H, we must do the same as at the Figure D, and we shall finde their height between the lines B and C, which we must take with a Compass, and transport them to the points G H, and do always the same for as many persons as you would diminish all unto one point,

Observe here all that may be said for the Measures of Figures, according to Perspective. But seeing that I am engaged for all the Measures of figures, I have set down all the Orders following, although they are not according to this Art.


A
25
Horizon
O
H
P
C
D
Z
20
15
10
5
C
B

For to give the natural height, or ſuch as one would to Figures elevated on high.

THAT we may omit nothing for the heights of Figures, we will ſet down alſo the two Rules following, whereof one hath already been given by *Albert Durer, Serlio*, and others, for to write letters in an eminent place, and to make them appear equal to thoſe below: by the ſame reaſon we may make uſe of it for to finde the Meaſures and the greatneſs of Figures, which ſhall appear all equal from a certain point where the Beholder ſhall be.

There is a man at the point B, five feet high, and diſtant from the Tower A fifty feet, which beholdeth the firſt Figure C, which appeareth to him as natural, and at 30 feet higher D he would ſet another Figure, which ſhould appear as natural as the other from the place where he is: How ſhould he finde its meaſure?

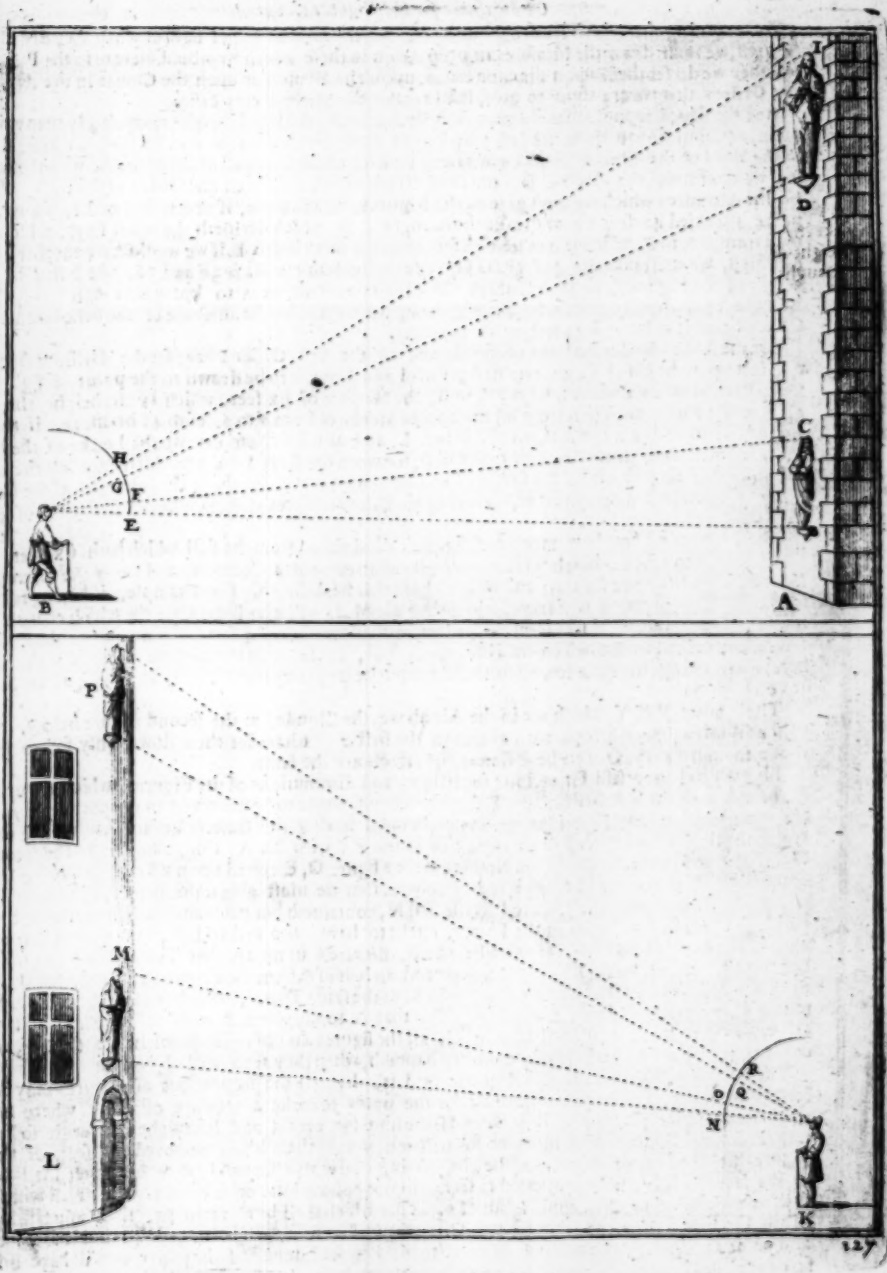
He muſt make a quarter of a Round, or only a little Arch upon the paper, which he muſt ſet before the Eye, and behold the feet and the head of the Figure C, and that ſhall give to the quarter of the Circle, the diſtance or the Angle E F, then he muſt at the ſame time, and without moving the quarter of the Circle, behold the point D, where ought to be the foot of the Figure D I, and to mark the point that it ſhall give at the quarter of the Circle, which is here the point G; and at this point G he muſt ſet the Angle, or the ſame diſtance that the Figure C ſhall have given, which is E F, which being tranſported unto G, ſhall give G H. Then by the point H, we muſt look where we ſhall divide the line elevated from D, which ſhall be at the point I, ſo that the diſtance D I ſhall be the height which we muſt give to the Figure which we would ſet there. He that would make one yet higher, hath only to do the ſame operations, and he ſhall have that which he deſireth, and they ſhall all appear as natural to the Beholder B. If one would know the reaſon, he muſt remember the Principles, or to look therein anew, and he ſhall finde that all the Objects view'd under equal Angles appear equal; now it is that the Angle G H is equal to E F, whereof the Figure D I muſt appear in the eye equal to the figure C.

For to know how much Figures equal diminiſh to the eye, the one ſet upon the others in height.

THE Beholders K, having a quarter of a Round, or part of a Circle, as that of the firſt figure B, he looketh upon the firſt figure M, from the Tower L, which appeared to him as Natural, meaſuring it from the feet unto the head; he marketh the Angle, or the diſtance upon his quarter of a Circle, which are N O; then without ſtirring any thing, he beholdeth alſo the feet and the head of the Figure P, and marketh upon his quarter of the Round the Angle that it giveth, which is Q R, if there were any alſo higher, he could take them all, and ſet them upon his quarter of a Round.

For to know the difference that there is from the one to the other, we muſt with a Compaſs take the Angles, or the diſtances of the one and of the other, and we ſhall know that the moſt elevated give the leaſt Angle, and by conſequence make appear to the eye the Figures leſſer; and then we may ſay, that the figure P appeareth not to the eye, but the half of the figure M, although that one be as high as that other. If one demand the reaſon, we ſhall ſay that the figure P giveth to the quarter of the Round of an Angle, which is but the half of the figure M, as one may ſee that Q R is but the half of N O, or very little to ſpeak of. By this knowledge we come to the other from above, and from that from above, to this here: for if M and P be of the ſame height, and that P from below appear not but the half of M; we may ſay aſſuredly, that to make P to be ſeen as M, that there would need yet as much more of height, the ſame is of that above, where the figure D, which is double of C, appeareth not at all greater, beholding it from the point B One may ſay alſo, that if D were not greater then C, there would appear but the half of its height, and ſo one Rule is the Reverſe of the other.

As well the firſt as the ſecond Order ought to be contracted, as the figures are made heretofore, where we ſhall have alſo aſſuredly the difference and proportion of the figures, as if they were taken at the Natural with this fourth of the Circle.


I
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M
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R
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K
127

Of Measures for the Figures elevated.

CConcerning that which we are speaking of, for the diminution of figures when they are elevated, we must draw the Measures in proportion to those which we would elevate in the Pictures, whether we do set them upon the Mountains, upon the Houses, or upon the Clouds in the Air. The two Orders that we are about to give, shall render the Method very easie.

For the first, I suppose that the man A is six feet high, the which height we multiply many times upon a plumb line B upon the base; and from these divisions from 6 to six feet, we must draw to the Head of the Figure A; Then having set a leg of the Compass at the point A, with the other leg we must make the Arch C D, and the sections which this Arch shall make of the Rays, shall be the Measures which we must give to the Figures, for example, if one would make a figure appeare Elevated 42 feet we must take the draught E D, which divideth the 2 last Rays, which we must transport to F, which is elevated 42 feet upon the same base A B. If we would have another at 30 feet high, we must take the draught G H, which divideth the Rays 30 and 36, which shall be the height of the Figure P, and so of others. All the concernment is to know how much this line B ought to approach or retire back, which ought always to be the distance of the beholder to the Object beheld, as here of 30 feet, or thereabout.

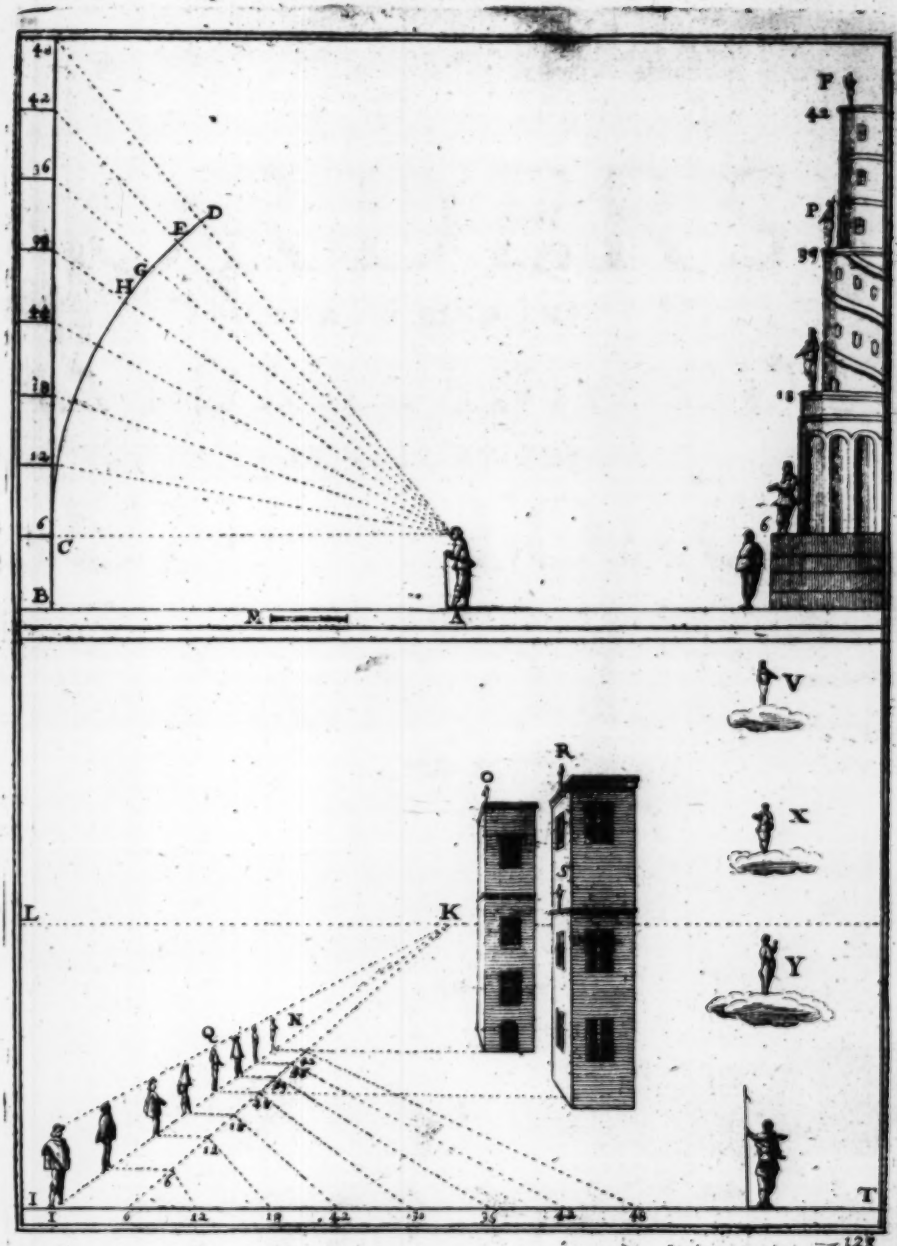
For the second Order, in stead of this line B, in the first Order I have set the divisions from 6 to 6 feet upon the base I T, the two first points I and 6 ought to be drawn to the point of sight K, for to have between these two Rays I K, 6 K, the Measure of six feet, which is the height that we give to the Figures. Then from all these other Measures from 6 to 6, unto 48 or more, if there be any, we must draw to the point of distance L, and at the sections that we shall make of the Ray 6 K; we must draw little Parallels to the base, between the Rays I 6; the which Parallels shall be the heights of figures within the sinking; and by consequence, for the figures elevated at the same distance, the which we may verifie, carrying back the Measures of the first Order with those of the second.

He that would know how much each figure is diminished from the first which hath six feet, he hath but only to take the height of that which he desireth with a Compass, and carry the Compass so open upon the little scale M, and he shall have that he desireth. For example, if having taken the height of the figure P we carry it upon the scale M, it will give but 4 feet, the which causeth to know, that a Figure of 6 feet elevated 30 feet, will appear but of 4 feet. The heights or diminutions of others shall be known by the same operations, so that it be in the same distance with these here; if one change the distance, all the Orders must be begun again all anew, and work as we have done.

The Figures V X Y, which are in the Air above the Clouds, at the second Figure below, are of the same height and proportion as that in the first: I have set them down only for to see, that although that the Orders be different, the effects are the same.

That which I have said for to finde the heights and diminutions of the Figures, which are upon the base A B of the first Order, and I T of the second, ought to be observed in proportion as they are sunk, and it must be that the most elevated having the same reference with those that are on the Ground, which are in the same line as this F P with this A For example, in the second Order, if over against the last figure N, there were a figure O, Elevated upon a Tower, 48 or 50 feet high, what Measures should we give it? I answer, that we must give it the same Proportion that this N, shall have with the I. And as the last N, containeth but twice and an half, of the 6, the I hath, this O which shall be upon the Tower, ought to have but 2 and an half of the 6 parts that the figure N hath. If I would have also a Figure R, Elevated upon another Tower of 48 or 50 feet before the figure Q, we must take also 2 parts and an half of 6, from the Figure Q, for the height of the Figure R. He that would have also one in S, at the same Tower, which is elevated 30 feet, he must give it 4 parts of the 6, of the Figure Q, that is to say, 4 feet, as we have found it in the first Order, between the Rays G H. In one word, all the figures do diminish themselves to the Eye, according as they are Elevated, as the contrary happeneth, when they are abased.

That which ought to make this Rule esteemed is, that all the proportions of Figures may be learned by heart, for he that would take the pains to make a Measure of this, where he might joyn more parts, and they would serve him for ever; and he might render it so familiar to himself, that in a moment he will tell you, that being removed 35 feet, if the Figure hath 6 feet, or 6 parts of height, being upon the Ground, One of which shall be of the same height, being elevated 12 feet, will not appear but of five and an half. That which shall be elevated to 18, shall appear but of 5. That which shall be elevated 24, shall appear but of 4 and an half. That of 30 but of 4. That of 36 of 3 feet; And that of 42 but of 2 feet and an half; And so proceeding from 6 to 6, as I had done, if the paper would have suffered it; It is enough, that it is known how we ought to do, for to set here a greater number thereof.



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ORDERS

FOR TO FIND THE

NATURAL SHADOVVS

AS WELL BY THE

SUN AND BY A TORCH

AS BY A

CANDLE

AND A

LAMP.

The Original of Shadows.

FOr to define the natural Shadow, we ſay not that it is an entire Privation of light; for that would be to ſay a perfect obſcurity, where we ſhould ſee as little the objects as their ſhadows, but we underſtand a diminution of Light, cauſed by the interpoſition of ſome body which is not tranſparent, the which receiving the Sun, or the clearneſs which ſhould caſt it ſelf upon the plane where it is ſet, giveth there a ſhadow of its ſhape, for the light being Comunicative of it ſelf, produceth it ſelf upon all that which is not hidden from it, & Extendeth it ſelf upon all that is plain and united: but if it meet which the leaſt Elevation, this hinderance cauſeth it to make a Shadow, which rendreth upon the Plane the forme and figure of that which is Enlightned.

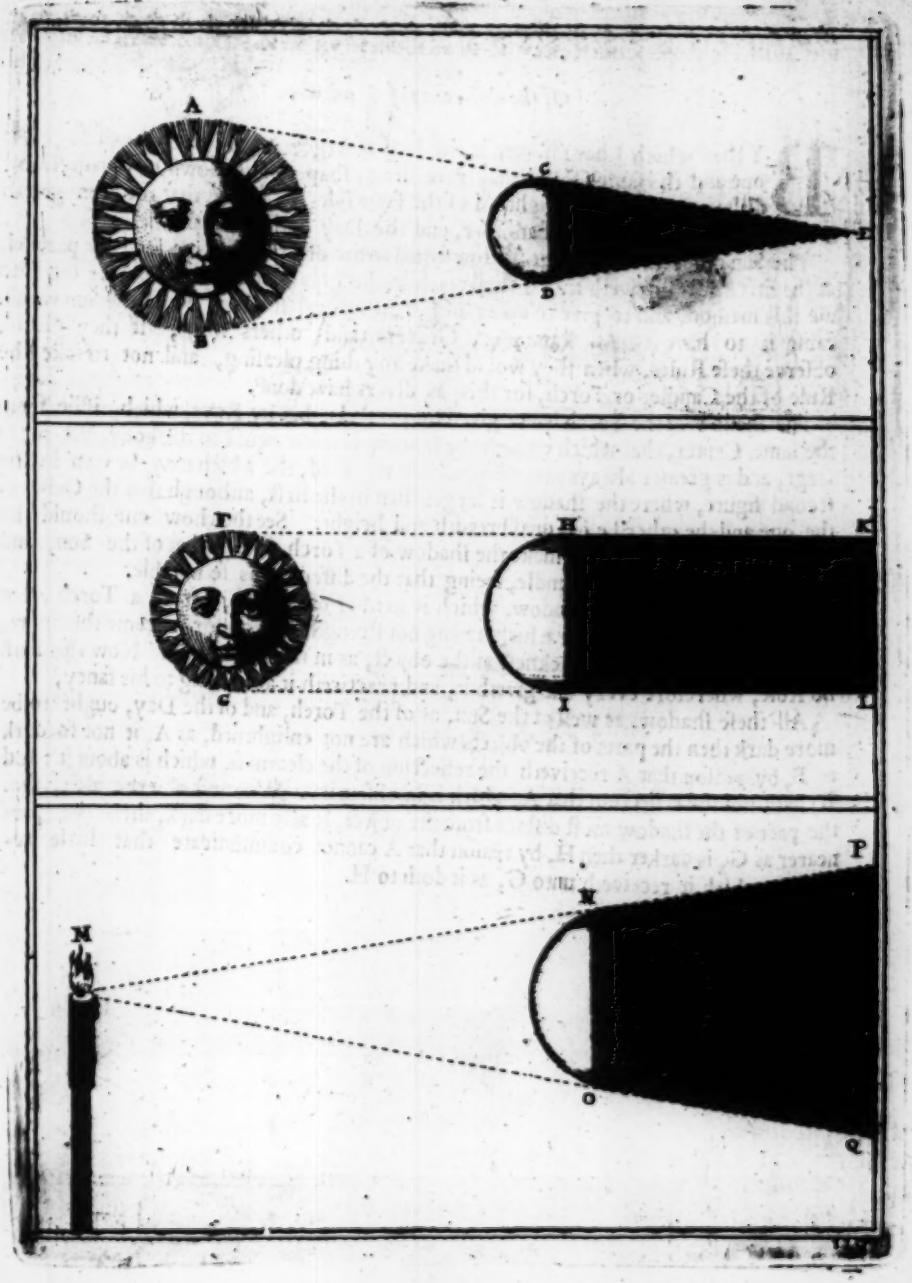
The diverſity of lights, maketh a diverſity of ſhadows for if the body that enlightneth is greater then that which is enlightned the ſhadow will be leſſer then the body if they be equall, the ſhadow will be equall to the Body enlightned: but if the light be leſſer then the Object, the ſhadow will ſtill be more and more the greater.

For to underſtand this the better, we will make the three figures following, which ſhall ſerve us as a foundation, for the Rules which we ſhall give.

The firſt ſheweth that the Body of light A B, being much greater then the Enlightned C D, it Enlightneth more then the half of the Object, the which maketh it to give a ſhadow with a Point and frame it into a Pyramide, whereof the Sun is the Baſe. This truth is ſhewed in the Eclipſe of the Moon, which is ſeldom wholly Covered with the ſhadow of the earth, which nevertheleſs exceedeth it in greatneſs forty times, by reaſon that the Sun, which is the body full of light, is an hundred ſixty ſix times, and more, greater then the Earth, which it enlightneth more then the half; and by conſequencee cauſeth to give a ſhadow to it in a point.

The ſecond, having the body of light F G, equal in greatneſs to the enlightned H I, it enlightneth the half of the Object, and giveth its ſhadow parallel H I K L.

The third maketh appear, that the lightſome body, or the light M, being leſs then that which is enlightned N O, is not enlightned by the half, the which cauſeth a ſhadow unto it, N O P Q, which enlargeth it ſelf according as it is removed, from the object, and maketh a Pyramide. whereof the light is the point.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Q

Of the difference of Shadows.

BY that which I have ſpoken in the Leaf aforegoing, we muſt conclude, that one and the ſame Object may give divers ſhapes of ſhadows or projections, although that it be enlightned of the ſame ſide; by reaſon that the Sun giveth it of one faſhion, the Torch of another, and the Day doth not frame it.

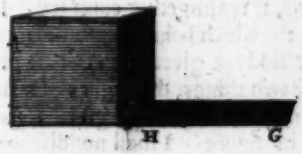
The Sun rendreth always the ſhadow equal to the object, that is to ſay, by parallel, as the firſt figure ſheweth it. I ſhall teach in the Leaves following, how we ought to uſe this method, and to give to every object the natural ſhadow, which the Sun would cauſe it to have; All Painters, Gravers and others may, if they pleaſe, obſerve theſe Rules, when they would make any thing pleaſing, and not to take the Rule of the Candle, or Torch, for this, as divers have done.

The ſhadow of the Torch is not given by paralels, but by Rays, which iſſue from the ſame Center, that which cauſeth the ſhadow is never equal to the body, but more large, and is greater always according as it is removed, the which may be ſeen in the ſecond figure, where the ſhadow is larger then in the firſt, although that the Cubes of the one and the other be of equal breadth and height. See then how one ſhould be much deceived if one ſhould make the ſhadow of a Torch, like as that of the Sun, and of the Sun, as that of the Candle, ſeeing that the difference is ſo notable.

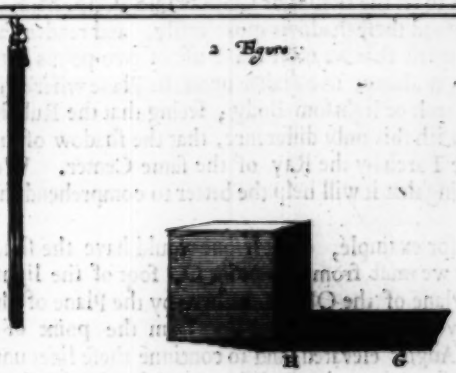
There is a third ſort of ſhadow, which is neither of the Sun, nor of a Torch, but only cauſed by a fair Day, the which having not ſtrength enough for to frame the figure, rendreth only a confuſed blackneſs at the object, as in the third figure. Now this hath no Rule, wherefore every one giveth it, and practiceth it according to his fancy.

All theſe ſhadows as well of the Sun, as of the Torch, and of the Day, ought to be more dark then the parts of the objects which are not enlightned, as A, it not ſo dark as B, by reaſon that A receiveth the reflection of the clearneſs, which is about it: and B, hath not the reflection that A, which is in obſcurity. We muſt obſerve alſo, that the part of the ſhadow moſt diſtant from the object, is alſo more dark, then the part nearer as G, is darker then H, by reaſon that A cannot communicate that little reflection which it receiveth unto G, as it doth to H.

1 Figure



2 Figure



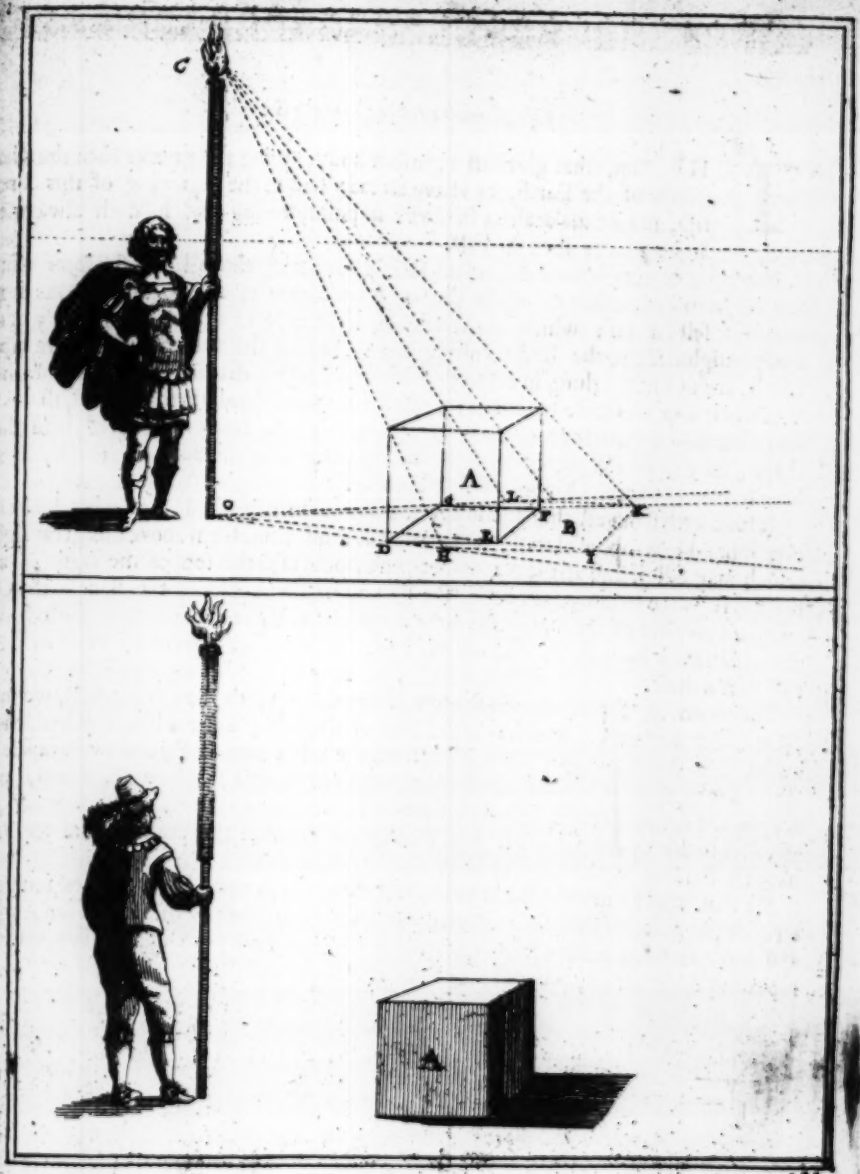
3 Figure

For to finde the ſhape of the Shadows.

WE ſhall obſerve at the beginning of this Book, that the Definition of Perſpective is to give upon a Plane perpendicular to the Horizon, the Repreſentation of Objects which are upon the Ground, or upon a Plane Horizontal: And for ſhadows, it is altogether contrary; ſeeing that one ſuppoſeth a Body elevated upon the Plane, the which being enlightned, caſteth its ſhadow upon the ſame Plane, as we ſee, that the Body A giveth upon the Plane the ſhadow B; for to finde the ſhadows we muſt ſuppoſe two things, the Light and a Body: The Light, although it be contrary to it, it is that nevertheleſs which giveth it its Being, and the Body or the Object giveth it its ſhape and its figure I ſhall not diſcourſe here but of ſhadows, for I ſuppoſe that we have learned to ſet the Bodies or Objects into Perſpective.

For to underſtand theſe ſhadows more eaſily, and render the Orders following more eaſie; we muſt mark that we muſt make uſe of two points: the one of the foot of the light, which ought always to be taken upon the Plane where the Object is placed; and the other of the Torch or lightſom Body; ſeeing that the Rule is general for the Sun and for the Torch, with this only difference, that the ſhadow of the Sun is given by Parallel, and that of the Torch by the Ray of the ſame Center. We will begin with that of the Torch, ſeeing that it will help the better to comprehend that of the Sun, which ſhall follow.

We ſay then for example, That if one would have the ſhadow of the Cube A, as we ſee B, that we muſt from the point O, foot of the light, draw lines by all the Angles of the Plane of the Object, as here by the Plane of the Cube O D, O E, O F, O G: Then you muſt draw other lines from the point of the light of the Torch by all the ſame Angles elevated, and to continne theſe lines until that they divide the other lines drawn from the point O: for example, having from the point O drawn the line paſſing by the Angle of the Plane D; if one draw from the point C, a line paſſing by the ſame Angle elevated; this ſhall divide the other at the point H, and the point H ſhall be the ſhadow of this Angle. If from the point C, we do the ſame by all the Angles elevated, we ſhall divide the lines of the Plane, at the points H I K L, the which points we muſt joyn with right lines, and we ſhall have the ſhadow of the Cube, as is to be ſeen at the Figure above, and more clearly at that below.



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Of Shadows taken from the Sun.

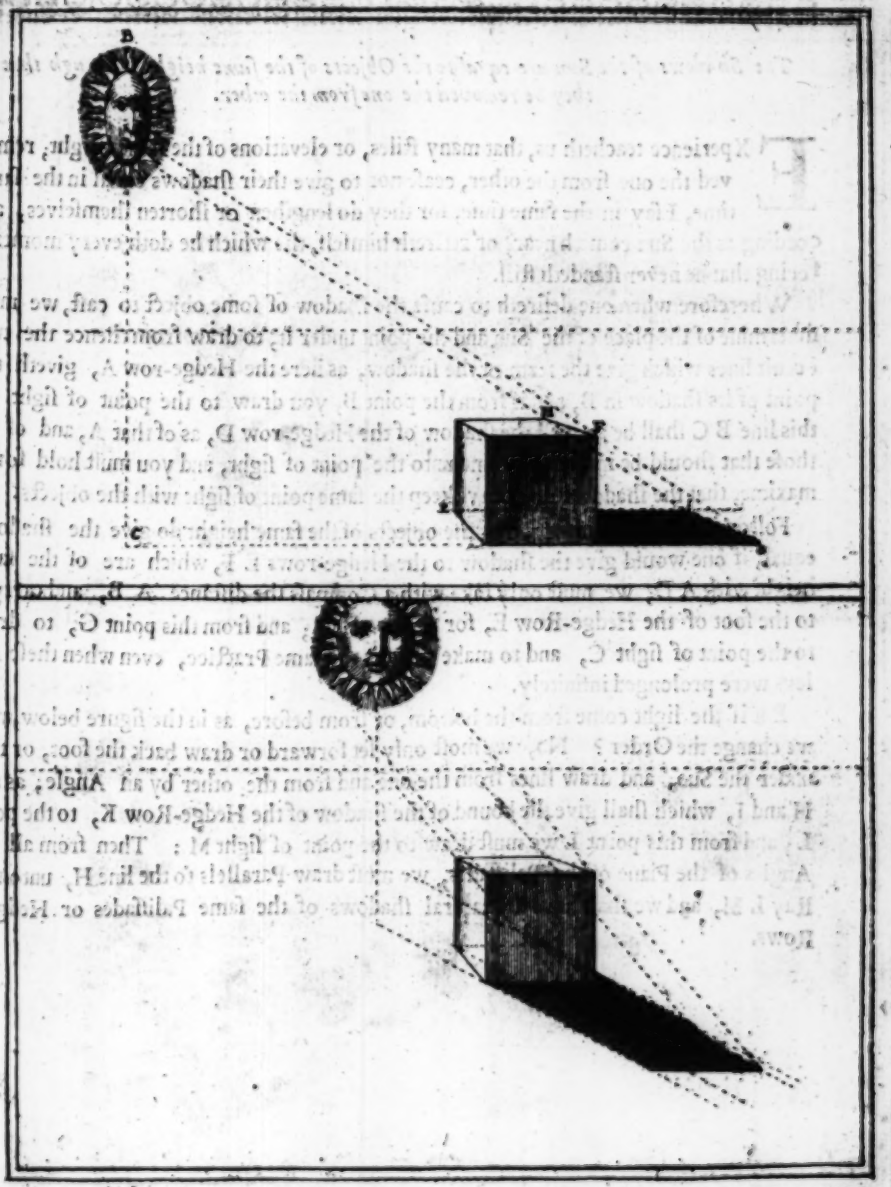
THE Sun, that glorious lightſom body, being far greater then the whole Globe of the Earth, as I have already ſaid in the beginning of this Treatiſe, ſhould make all its ſhadows in point, ſeeing that he doth always enlighten more then the half.

In purſuit of this demonſtration we ſhould conclude, that all the ſhadows of the Sun ought to be leſs then the Body that is oppoſed unto it, and to diminiſh as it removeth it ſelf far off: which would be true, if there were any correſpondency of the Body enlightned, to the Body enlightning: but all the Objects which are upon Earth, are ſo ſmall a thing in reſpect of this great light, that the diminution of their ſhadows is unperceivable by our eyes, which acknowledged them all equal, that is to ſay, that they are neither larger nor ſtreighter, then the Bodies that give them their ſhape; for this reaſon, we give all the ſhadows cauſed by the Sun by Parallels, as we have ſeen at the ſecond Figure of this Treatiſe.

It followeth from all this diſcourſe, that for to have the ſhadow of what body ſoever it be, being oppoſed to the Sun, we muſt draw a line from above this great light, which may fall plumb at the place where one would take the foot of the light; and from this place to draw an occult line by one of the Angles of the Plane of the Object, and another of the Sun by the ſame Angle elevated, and the ſection of theſe two lines ſhall ſhew how far the ſhadow muſt go, all the other lines ſhall be drawn Parallel to theſe.

For example, for to take the ſhadow of the Cube A, the Sun being at B, we muſt from under the Sun C, which is as the foot of the light, draw a line which toucheth an Angle of the Plane, as C D. Then from the other Angles E, to draw Parallels to this: for to finde the end of the ſhadow, we muſt draw a line from the Sun B, paſſing by the Angle elevated F, which ſhall divide the line C D in G. Then drawing a Parallel to this by the Angle H, it will divide the line E at the point I, and we ſhall have the ſhadow of the Cube D G L.

He that would cauſe the ſhadows to caſt before, or in any other way; he muſt determine the place of the Sun, and the point underneath, to draw the lines of an Angle, and make all other lines parallel to that, as you may ſee by the figure below, without repeating the Practick, which is the ſame as that above.


B
C

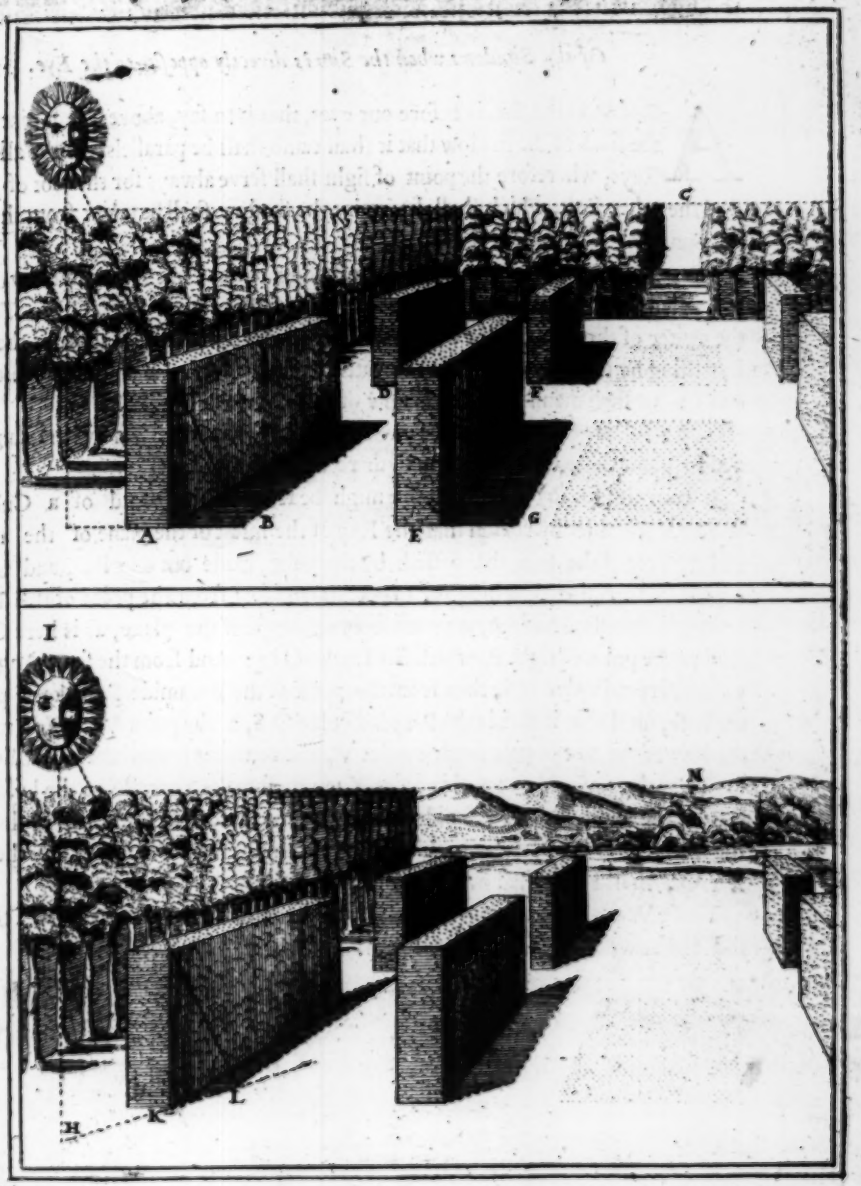
The Shadows of the Sun are equal to the Objects of the ſame height, although that they be removed the one from the other.

EXperience teacheth us, that many ſtiles, or elevations of the ſame height, removed the one from the other, ceaſe not to give their ſhadows equal in the ſame time, I ſay in the ſame time, for they do lengthen or ſhorten themſelves, according as the Sun cometh near, or retireth himſelf, the which he doth every moment, ſeeing that he never ſtandeth ſtill.

Wherefore when one deſireth to cauſe the ſhadow of ſome object to caſt, we muſt determine of the place of the Sun and the point under it, to draw from thence the two occult lines which give the term of the ſhadow, as here the Hedge-row A, giveth the point of its ſhadow in B, and if from the point B, you draw to the point of ſight C, this line B C ſhall be as well the ſhadow of the Hedge-row D, as of that A, and of all thoſe that ſhould be in the ſame line unto the point of ſight, and you muſt hold for a maxime, that the ſhadows do always keep the ſame point of ſight with the objects.

Following this experience, that the objects of the ſame height do give the ſhadows equal, if one would give the ſhadow to the Hedge-rows E F, which are of the ſame height with A D; we muſt only take with a Compaſs the diſtance A B, and carry it to the foot of the Hedge-Row E, for to have E G; and from this point G, to draw to the point of ſight C, and to make always the ſame Practice, even when theſe Alleys were prolonged infinitely.

But if the light come from the bottom, or from before, as in the figure below, muſt we change the Order? No, we moſt only ſet forward or draw back the foot, or that under the Sun, and draw lines from the one and from the other by an Angle, as are H and I, which ſhall give the bound of the ſhadow of the Hedge-Row K, to the point L; and from this point L we muſt draw to the point of ſight M: Then from all the Angles of the Plane of the Paliſſades, we muſt draw Parallels to the line H, unto the Ray L M, and we ſhall have the natural ſhadows of the ſame Paliſſades or Hedge-Rows.


C
D
F
A
B
E
G
I
N
H
K
L

Of the Shadows when the Sun is directly oppoſit to the Eye.

AS often as the Sun is before our eyes, that is to ſay, above the point of ſight; the ſides of the ſhadow that it ſhall cauſe ſhall be parallels, as are all the viſual Rays; wherefore the point of ſight ſhall ſerve always for the foot of the light; And the other Ray, which ſhall determine the ſhadow, ſhall be taken from the center of the Sun.

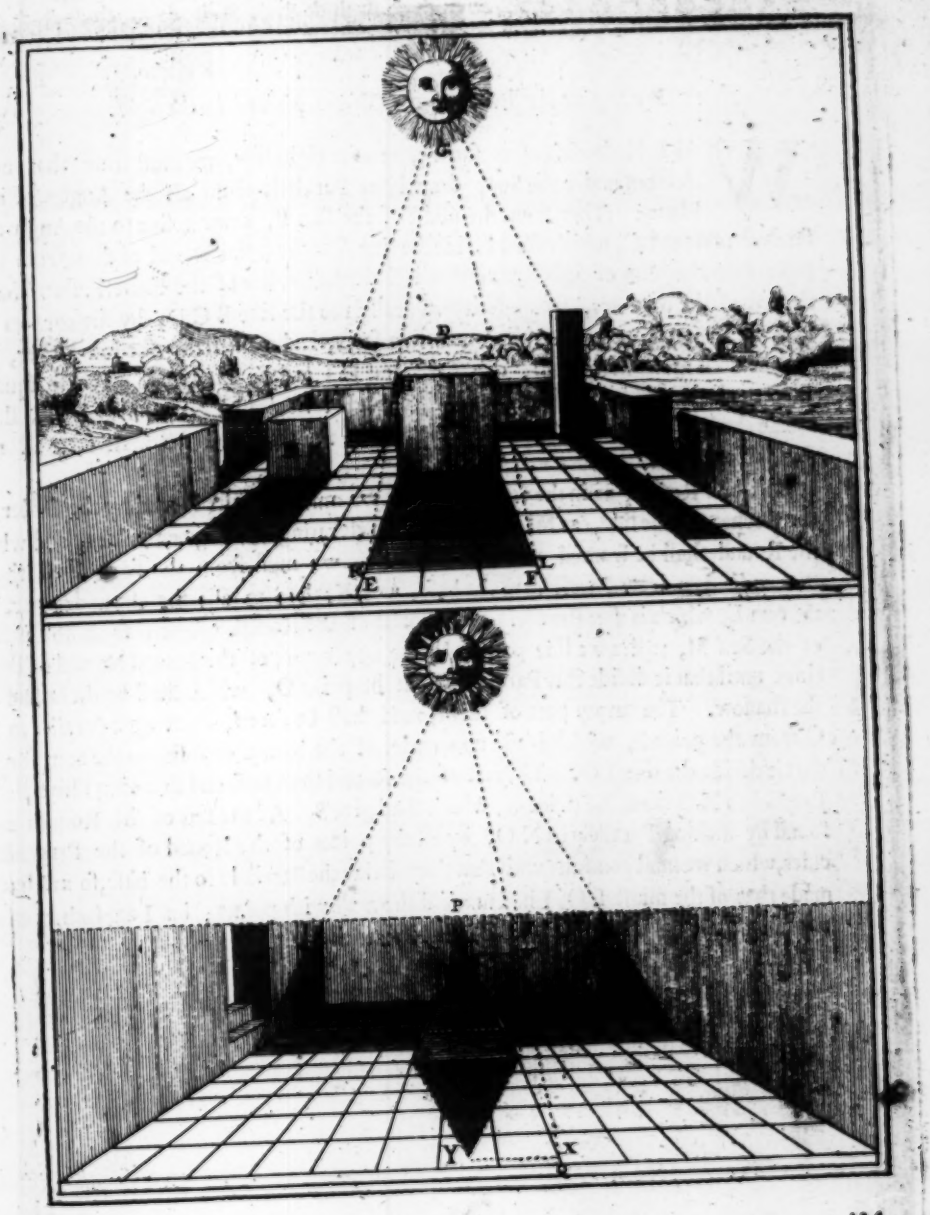
For example, when we would find the ſhadow of the Cube A, we muſt by the Angles of its plane B C, draw Rays to the point of ſight D, as are B E, C F. Then from the center of the Sun G, draw alſo two Rays, which ſhall divide thoſe at the point K L, paſſing by the ends of the lines elevated from the angles B and C, which are H and I: In ſuch manner as the ſhadow of this Cube ſhall be B K L C.

The ſhadows of the two other pieces M and N, ſhall be taken by the ſame order, and ſo of all the others, which may there be met withall.

It cometh into my mind, that one might be troubled, if inſtead of a Cube, there were a Pyramide: by reaſon that the Ray of the midſt of the plane of the Pyramide, and the Ray of the Sun, that paſſeth by the point, made but one line, and by conſequence can terminate nothing for to take the ſhadow from the point of this Pyramide.

When this ſhall happen, we muſt from an Angle of the plane, as is here O, draw a Ray to the point of ſight P, which ſhall make O Q: And from the ſame Angle O, elevate a Perpendicular O S, then from the point of the Pyramide T, make a parallel to the baſe, until that it divide the Perpendicular O S, at the point V: We muſt make the Ray of the Sun to paſs by this point V, and continue it until that it divide the Ray O Q, at the point X, from this point X, we muſt make a parallel to the baſe, unto the Ray of the midſt of the Pyramide, which ſhall be divided at the point Y, the bound of the ſhadow: We muſt draw to this point Y, from the Angles Z and O, and the Triangle Z Y O, ſhall be the ſhadow of the Pyramide.

Theſe Walls, which are at the bottom of the one and the other figures, take their ſhadows as we have ſaid of the Cube A.



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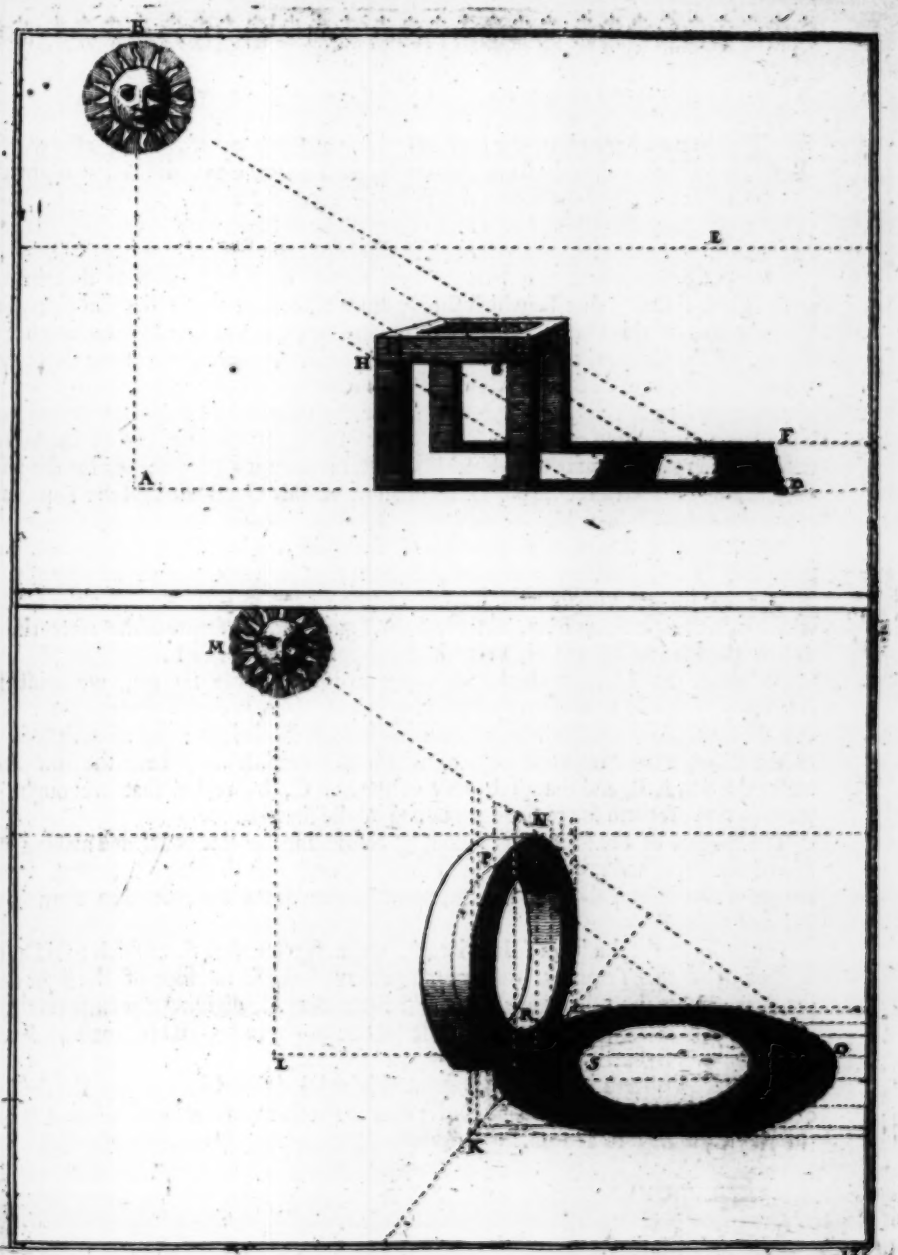
For to give the ſhadow of the Objects pierced by the light.

WHEN the Object is ſquare, or of a right line, we muſt from the point A from under the Sun, draw lines Parallels from all the Angles of the Plane: Then from the midſt of the Sun B, draw a line to the Angle the fartheſt removed C, which ſhall divide the line A at the point D, and to draw from the point D to the point of ſight E, until that it finde the laſt line of the Plane F: for to have the reſt of the ſhadows, we muſt draw Parallels to the line B C D, by the corners G H I, by reaſon that the Sun enlightneth two faces, and maketh the ſhadow larger, as is to be ſeen in the firſt figure, that G C and H I are the Diagonals of theſe ſquare Pieces enlightned on two ſides; and where theſe lines drawn by C G and H I ſhall divide the line A, we muſt draw to the point of ſight E, and we ſhall have all the Projection, or the ſhadow of the Object.

If it be a Round, as in the ſecond figure, we muſt make the Round by the Order of the Arches on the ſide, as fol. 62. and 63 by elevating the Perpendiculars, and when the Round ſhall be framed with its thickneſſes, we muſt from the foot of all theſe Perpendiculars draw Parallels to the baſe, as L K, then to take for the under-part of the Sun L, which is the Parallel of the midſt of the Round. Then from the midſt of the Sun M, to draw a line paſſing by the upper part of the Round N, and to continue until that it divide this Parallel L, at the point O, which ſhall be the bound of the ſhadow. The empty part of this Round ſhall be found, drawing a Parallel to N O from the point P, which is the upper part of the Round oppoſite to the Sun, until that it divide the line I O. The reſt of the Round ſhall be found drawing alſo a little Parallel to N O from the point R, which ſhall give S. All the reſt of the Rounds are found by making Parallels to N O, by all the points of the Round of the Perpendicules, which we muſt continue until that they divide the Parallels to the baſe, ſo as I have made that of the midſt L O, I had marked them all with points; but I am ſuch an enemy of confuſion, that this hath cauſed me to omit them.


B
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K

The Shadows take the ſhape of the Planes where they are caſt

HItherto I have given the ſhadows within a Plane united, being aſſured that he which ſhall underſtand them well, ſhall not have any difficulty to practiſe theſe here, and the others that follow; becauſe that it is all the ſame Rule, and that one only direction ſhall ſuffice for to make to underſtand, how theſe ſhadows do raiſe and abaſe themſelves according as they finde their Planes

For to make it appear, that theſe ſhadows are found by the ſame Rule that the former, is it not certain that he which ſhould draw a line from under the Sun A, paſſing by the Plane of this Gate B, and that from the Sun C, one ſhould draw another by the top of the Gate D, that theſe lines would divide themſelves out of our paper, and would give the bound of the ſhadow, ſo as I have ſaid of others? But the wall E hindring the line A B to prolong it ſelf, as it would do if the Plane were united, obligeth it to raiſe it ſelf as we ſee E G: wherefore it is that the Ray of the Sun C, which ought to go very far to ſeek the line A B, divideth it againſt the wall at the point G, and there marketh the ſhape, or the ſhadow of this Gate, whereof the Top draweth to the point of ſight H.

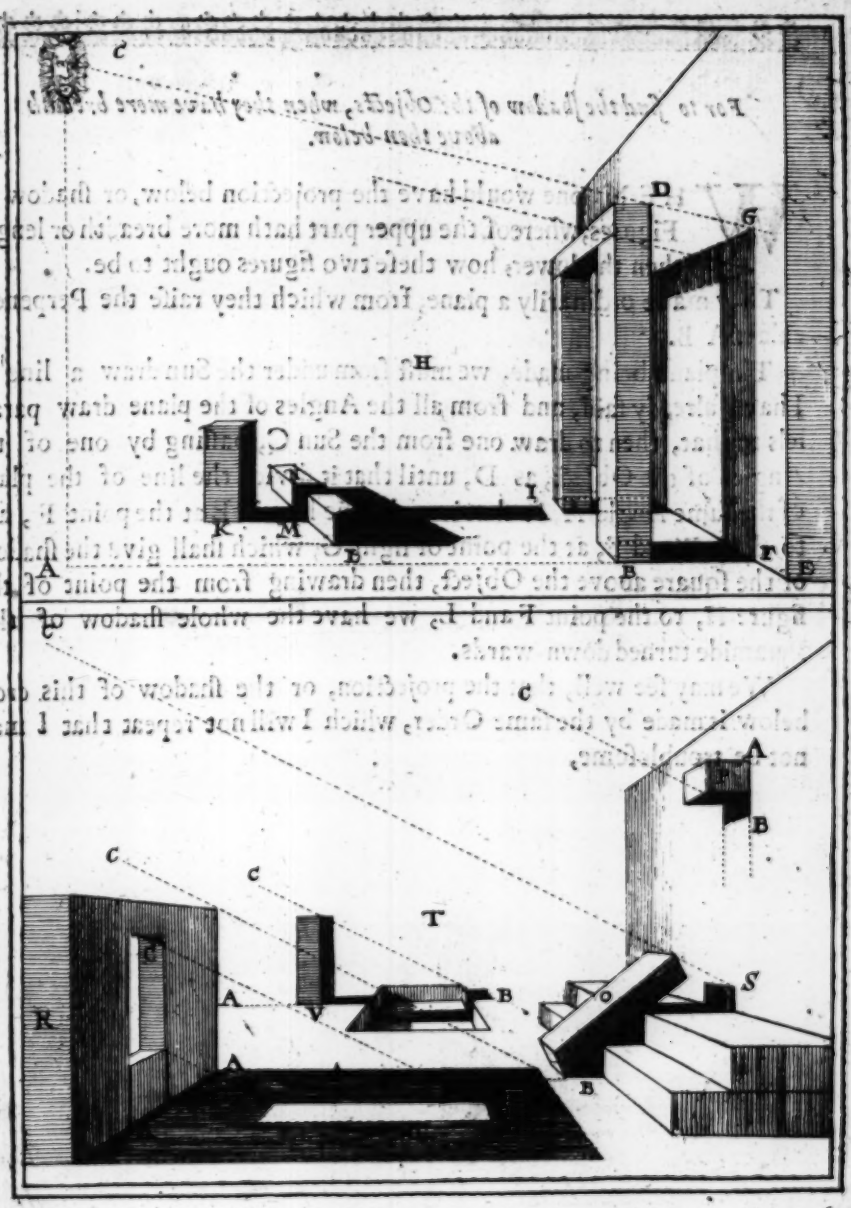
The ſhadow of this piece K caſteth its ſelf with its whole length K I, paſſing over this other piece I; and we muſt mark, that the ſhadow keepeth always its length, although that it meet with ſomething between two: and it muſt be, that the ſhadow which paſſeth over ſomething, obſerveth the figure and the forme of the ſame thing: as here the ſhadow M and N, keepeth the ſhape of the Piece L.

Although that I have made the Sun to appear in the other figures, we muſt not think that he ſhould be ſo near the Objects; it hath bin only for to give to underſtand, that the Rays do come from thence, whenas he is in this height: but nevertheleſs, out of the Piece, as in this ſecond Figure, which yet ceaſeth not, have the line from under the Sun A B, and that of the Ray of the Sun C, by reaſon that we ought always to ſuppoſe them for to finde the bound of the ſhadow.

The ſhadow of the Piece O is found, by continuing the line A B, and making it to aſcend the ſteps, and raiſe it ſelf againſt the wall, until that the Ray C, paſſing by the corner of the Piece, divideth it at the point S, then from the point S to draw to the point of ſight T

For to finde the ſhadow of the Piece P, we muſt remember that which I ſaid at the beginning of this Treatiſe, that we muſt always ſuppoſe the foot of the light upon the Plane where the Object is placed, and ſo the Ray C, dividing the little line A B, ſheweth how far the ſhadow of the little piece P ought to go, which muſt be drawn to the point of ſight T.

The Piece V giveth its ſhadow all along, although it deſcend into a Pit; the ſhadow of the wall R is found by the ſame Order that the others, as alſo the lines A B, and the Ray C, cauſe it to be ſeen.



136

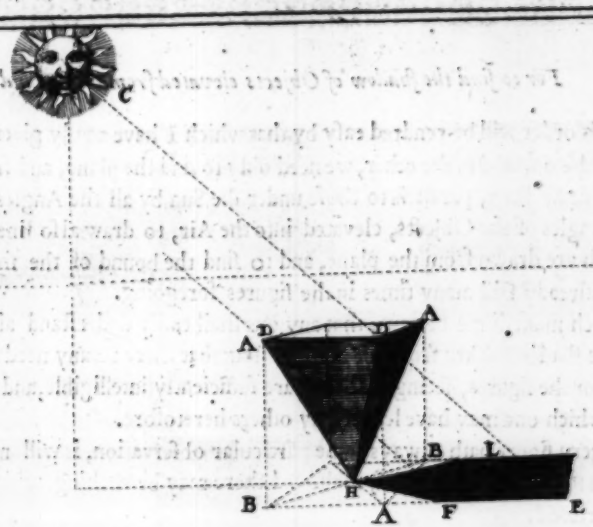
For to find the ſhadow of the Objects, when they have more breadth above then below.

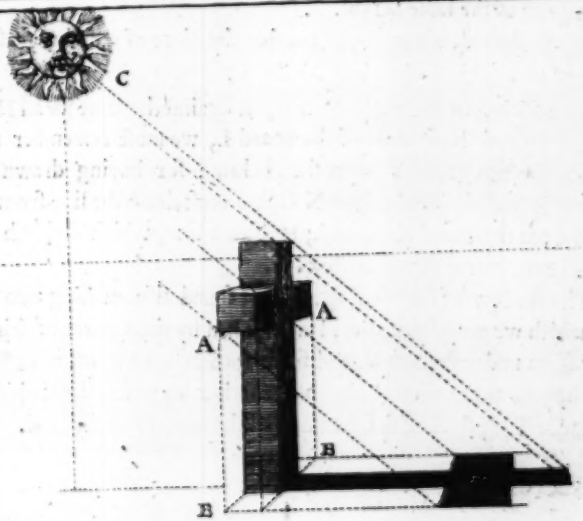
WHEN one would have the projection below, or ſhadow of Figures, whereof the upper part hath more breadth or length then the lower, how theſe two figures ought to be.

They make ordinarily a plane, from which they raiſe the Perpendiculars A B.

The plane being made, we muſt from under the Sun draw a line as I have already ſaid, and from all the Angles of the plane draw parallels to that, then to draw one from the Sun C, paſſing by one of the Angles of the Object, as D, until that it divide the line of the plane of the ſame Angle A, ſo that it make the line D E at the point F, and to draw E and F, at the point of ſight G, which ſhall give the ſhadow of the ſquare above the Object, then drawing from the point of the figure H, to the point F and L, we have the whole ſhadow of this Pyramide turned down-wards.

We may ſee well, that the projection, or the ſhadow of this croſs below is made by the ſame Order, which I will not repeat that I may not be troubleſome,





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For to find the ſhadow of Objects elevated from the Ground.

THis order will be rendred eaſy by that which I have newly given, ſeeing that in the one and in the other, we need only to find the plane, and from this plane to draw lines, parallels to thoſe under the Sun by all the Angles, then from the ſame Angles of the Objects, elevated into the Air, to draw alſo lines for to divide thoſe which are drawn from the plane, and to find the bound of the ſhadows, as I have here already ſaid many times in the figures foregoing.

The which maketh me believe, that any one ſhall eaſily underſtand all that I can make of the ſhadows taken from the Sun, without that there be any need of other explications for the figures, ſeeing that they are ſufficiently intelligible, and all made by the Rules which one may have learned by others heretofore.

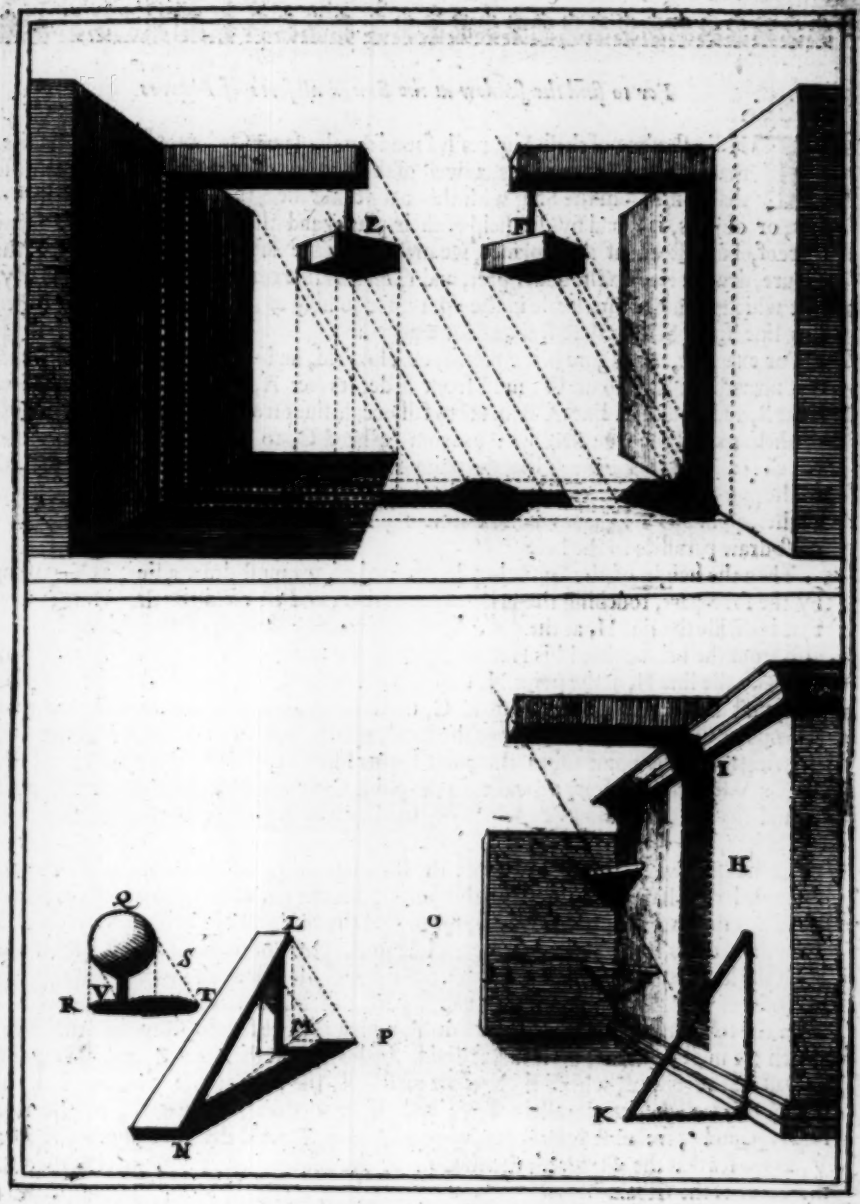
But as every figure hath always ſome particular obſervation, it will not be beſides the purpoſe to give notice thereof, to the end there may be nothing, which may not be eaſily underſtood.

I ſay then, that in the firſt figure, I have only made uſe of the plane A B C D, for to find the ſhadows of the objects E and F, by reaſon that they are both upon the ſame line, and of the ſame height.

In the ſecond, we muſt obſerve that the piece of wood G, caſting its ſhadow upon the Wall H; this ſhadow maketh the ſame figure that the Corniche I, which is below, the which is ſeen alſo at the Staff K, ſet againſt the ſame Wall H.

For to find the ſhadow of the board L, we muſt remember the order afore-going of the Objects broader above then below: for having drawn the Perpendicule M, where it ſhall divide the Ray N O, we muſt draw the line from under the Sun M P, then from the board elevated L, to draw a line, which divideth M P, and this ſection ſhall be the bound of the ſhadow.

The ſhadow of the Boul Q, ſhall be found alſo, making two Perpendiculars to fall, of which we muſt frame the plane: Then by the Center of this plane, to draw the line from under the Sun R, and from the Sun a Tangent, as Q S, until that we divide the line R, at the point T, and alſo another V, which divideth the ſame R, and this diſtance T V, ſhall be the greatneſs of the ſhadow of the boul.



138

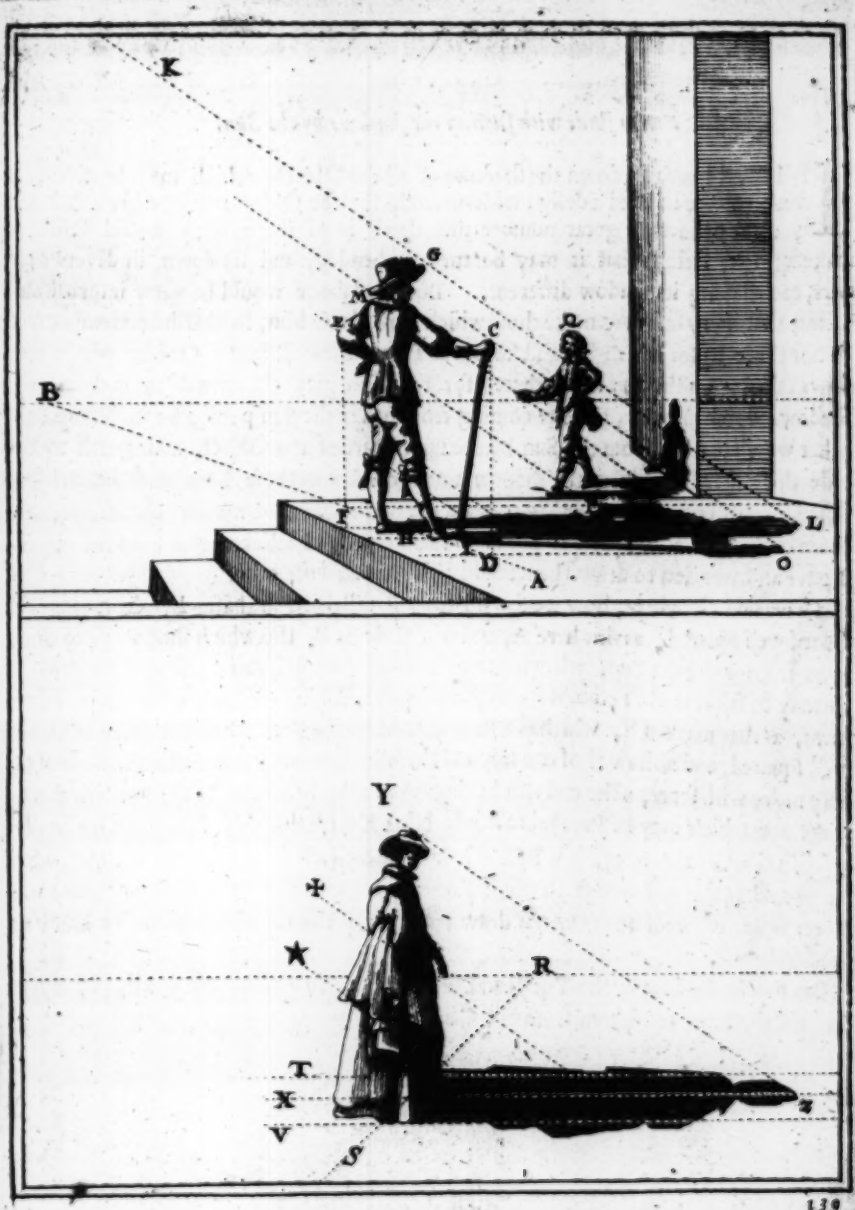
For to find the ſhadow of the Sun in all ſorts of Figures.

THE ſhadow of theſe Figures is found by the ſame Orders of other bodies, that is to ſay, by parallels, as well of them from under the Figure, as of thoſe that come from the Sun; with this only difference, that the ſhadow of the bodies, or objects, is found by the help of their plane, and that the figures have none thereof, but inſtead of theſe planes, we muſt, from the aſpect whereby we ſee the Figure, draw a line by the under part, and upon this line make to fall perpendicularly, that which is moſt remarkable in the figure, for to help to find the ſhadow, and then this line from below, ſhall ſerve as for a plane.

For example, the figure being naked, or cloathed, and without a Cloak, as the firſt that turneth the back to us: We muſt from under its feet A, draw a line to the point of ſight B, and upon this line A B, make to fall occult lines from all the points which can help to find the true ſhadow: as from the hand C, to make to fall a Plumb-line, which ſhall divide the line A B at the point D, and from the Elbow E, to make one fall to the point F, and yet another from the head G, which ſhall give the point H, from all theſe points D F H, from the feet of the figure, and from the end of his Staff I. We muſt draw parallels to the baſe

Then the height of the Sun being determined of, we muſt draw a line, as K, paſſing by the fore-part, touching the brim of the Hat G, and to continue the ſame, until that it divide the line H, at the point L, which ſhall be the end of the ſhadow. And alſo from the brim behind his Hat M, to draw a parallel to K G L, until that it divide alſo the line H, at the point N, theſe points N L, ſhall be the ſhadow of the Hat. We muſt draw a parallel by the point C, until that it divide the line D, at the point O. This point O ſhall be the ſhadow of the hand, which holdeth the Staff: Wherefore drawing from this point O, to the point I, this line O I, ſhall be the ſhadow of the Staff: We muſt alſo draw a parallel to the point E, which ſhall divide F, at the point P, and ſhall be the ſhadow of the Elbow, and ſo of all the places that one would, as of the Knees, upon the parallels, which paſs under the feet; and from all theſe points to mark the ſhadow of the whole figure: the little figure Q, hath taken its ſhadow by the ſame order. I have not marked all the points, nor the parallels for to avoid confuſion.

When they are cloathed at length, for to find the ſhadows of the figures, we muſt, as I have ſaid draw from under their feet, a line to the point of ſight R, as this S R, and from the bottom of the garment on the one ſide and the other, draw two parallels to the baſe, as T V, and between T V, another X, which is the midſt of the figure. Then from the top of the Head, to draw a line Y, which ſhall be for the Ray of the Sun, which we muſt continue, until that it divide the line X, at the point Z, and this point Z ſhall be the bound, where the ſhadow muſt end, the reſt of the ſhadow ſhall be drawn between the two parallels T V, and if any thing flow over, as the two folds ✠, and *, we muſt draw them by parallel to Y X, until that they divide the Ray V, as we ſee that the ✠, giveth the ſhadow of the Elbow, and the *, giveth that of the folds of the Cloak.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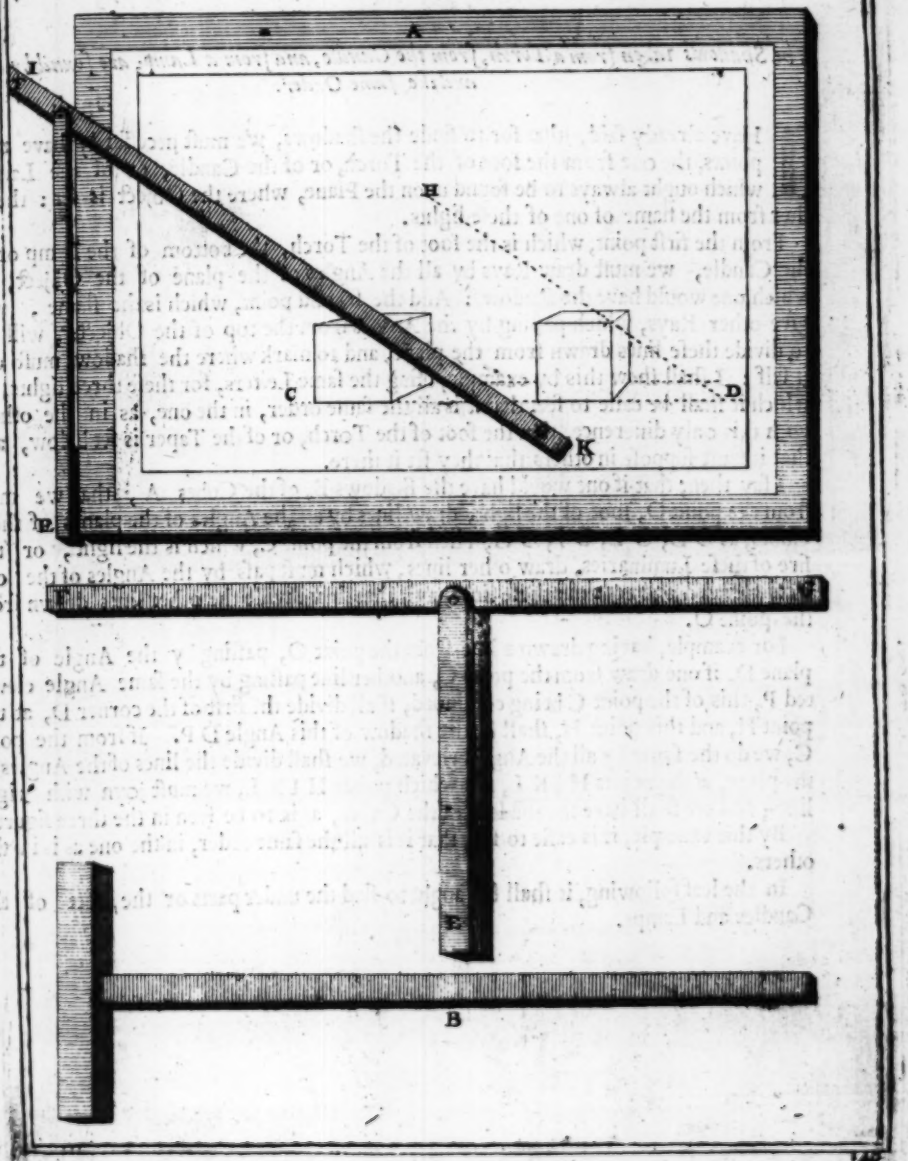
Z

For to finde with facility the ſhadows by the Sun.

IF I would here ſet down the ſhadows of all the Objects which may be given, it were to take in hand a deſign without end, for the Objects may be given infinitely: for beſides the great number that there is of them, each would ſuffice to make a Book, ſeeing that it may be turned, bended, and lie down in divers manners, each having its ſhadow different. But this labour would be very unprofitable ſeeing that every one may make thoſe which ſhall pleaſe him, ſo that he remember well twoor three Rules which he muſt keep, as I have ſhewed in the Orders of the ſhadows taken from the Sun: where two ſorts of lines give the means to finde all the ſhadows which may be; the one coming from under the Sun paſſing by the Plane: the other which parteth from the Sun by the upper part of the Object, and goeth to divide this other line, where the ſhadow muſt go: but as theſe lines muſt be each Parallels: that is to ſay, thoſe from under the Sun Parallels between themſelves, and thoſe of the Sun alſo Parallels between themſelves. I believed that I ſhould oblige, I gave an Invention to draw them readily the one and the other.

I have ſaid elſewhere, how we ſhould draw Parallels to the baſe, by the means of a Board well ſquared, as this here A, and of a Rule as B, the which ſhall ſerve to draw lines from under the Sun, when it meeteth directly oppoſite to the face of the Object, as may be the line C D; but if it enlighten by the Angle, we muſt uſe another inſtrument, as that marked E, which is a Rule faſtned to the End of another piece of Wood well ſquared, and hollowed of one ſide and the other, in ſuch manner that the Rule F G, may move with force, to the end that having taken a line bended as H D, one may therby make one which may be Parallel to it, which is I K with this falſe ſquare or Graſhoper, it is ſo as the Workmen call it E F G, this Inſtrument doth abbreviate exceedingly, when one would make ſhadows of the Sun, for there is not a line, and of what inclination ſoever it be, whereof one may not draw Parallels. The uſe will make us to know its profitableneſs.

But for the ſhadow by the Torch and the Candle, it is of no uſe at all, by reaſon that all the lines are drawn from one Center.


A
I
H
C
D
K
B

The Shadows taken from a Torch, from the Candle, and from a Lamp, are found by one and the same Order.

I Have already ſaid, that for to finde the ſhadows, we muſt neceſſarily have two points, the one from the foot of the Torch, or of the Candle, or of the Lamp, which ought always to be found upon the Plane, where the Object is ſet: the other from the flame of one of theſe lights.

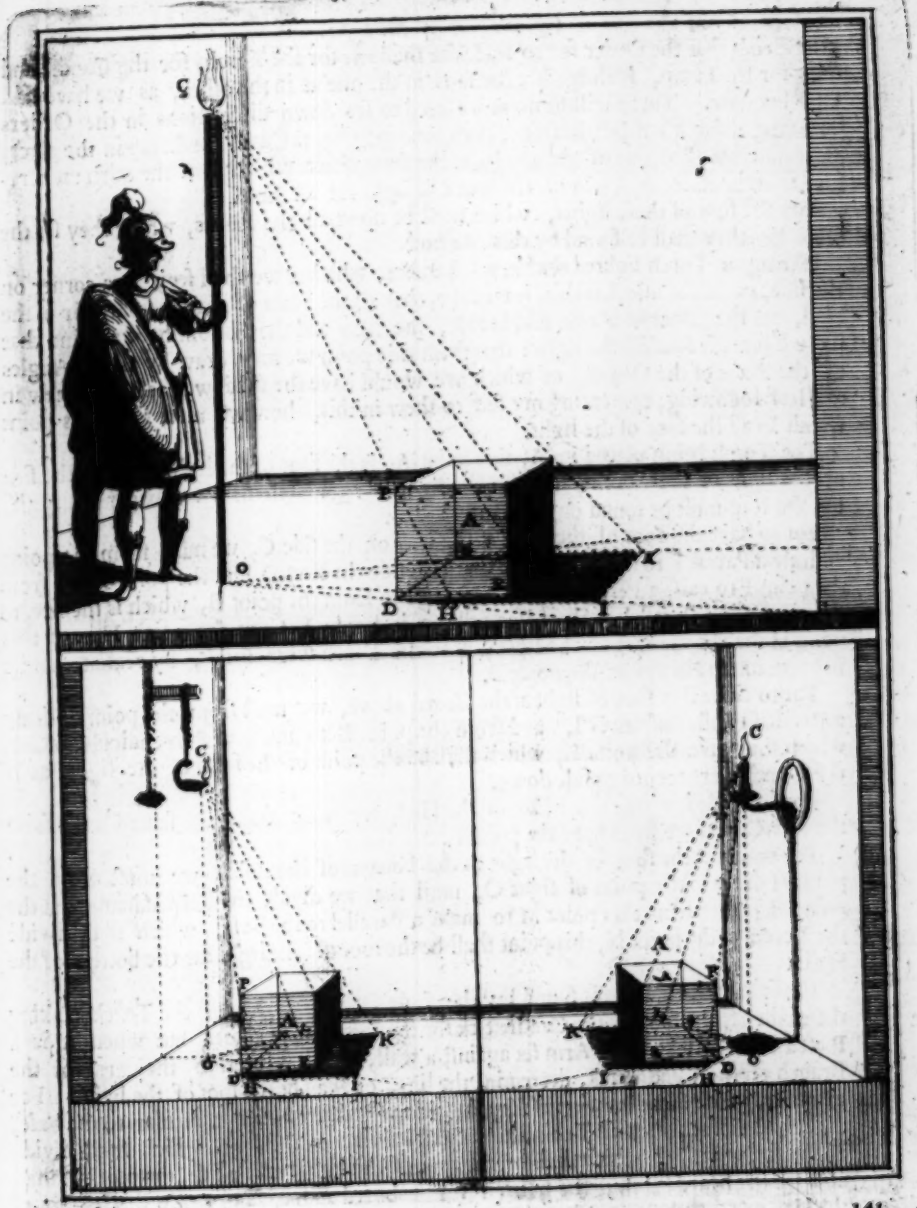
From the firſt point, which is the foot of the Torch, the bottom of the Lamp or of the Candle, we muſt draw Rays by all the Angles of the plane of the Object, of which one would have the ſhadow: And the ſecond point, which is the flame, will give other Rays, which paſſing by the Angles from the top of the Objects, will go to divide theſe lines drawn from the plane, and to mark where the ſhadow muſt end it ſelf: I ſhall ſhew this by example, uſing the ſame Letters, for theſe three lights, in which it ſhall be eaſie to ſee, that it is all the ſame order, in the one, as in the other, with this only difference, that the foot of the Torch, or of the Taper is ſet below, and that it muſt ſuppoſe in others that they ſet it there.

I ſay then, that if one would have the ſhadows B, of the Cubes A, that we muſt from the point O, foot of the light, draw lines by all the Angles of the planes of theſe Cubes, as O D, O E, O F, O G, Then from the point C, which is the light, or the fire of theſe Luminaries, draw other lines, which muſt paſs by the Angles of the objects elevated, and continue theſe lines, until that they divide the other lines drawn from the point O.

For example, having drawn a line from the point O, paſſing by the Angle of the plane D, if one draw from the point C, another line paſſing by the ſame Angle elevated P, this of the point C being continued, ſhall divide the firſt of the corner D, at the point H, and this point H, ſhall be the ſhadow of this Angle D P. If from the point C, we do the ſame by all the Angles elevated, we ſhall divide the lines of the Angles of the plane, at the points H I K L, the which points H I K L, we muſt joyn with right lines; and we ſhall have the ſhadow of the Cubes, as is to be ſeen in the three figures.

By this example, it is eaſie to ſee, that it is all the ſame order, in the one as is in the others.

In the leaf following, it ſhall be taught to find the under parts or the feet of the Candles and Lamps.



141

Of the foot of the light.

SEeing that the Order for to finde the ſhadows for the Torch, for the Candle and for the Lamp, is altogether the ſame in the one as in the other, as we have ſaid but now. There will be no more need to ſet down diſtinctions in the Orders following: for when I ſhall ſet a Torch, one may ſet a Candle or Lamp in the place, by reaſon that the flame of the one hath the ſame effect with that of the other: wherefore from henceforth, I will uſe the word of light for all three.

For the foot of theſe lights, which muſt be upon all the Planes, where they ſet the Objects, they ſhall be found by this Method.

Having a Torch lighted within a Chamber, whether we ſhall ſet it in a corner on the ſide, or in the midſt as this, it muſt be, that all the Parts of the Chamber, or of the Hall, as the Boards above and below, the ſides and the bottom have a point that ſerveth for the foot of the light: that from this point we may draw by all the Angles of the Plane of the Object, of which we would have the ſhadow, as I ſhall ſhew in the leaf following, contenting my ſelf to ſhew in this, how we muſt finde this point which I call the foot of the light.

The Torch being placed in A, this point A, is the foot of the light, and B the fire or the light of the Torch; this fire or light B remaineth firm and never changeth, but the foot muſt be found on all ſides.

For to have the foot of the light at the wall on the ſide C, we muſt from the point A draw a Parallel to the baſe, until that it divide the Ray D E at the point F, and from the point F to raiſe a Perpendicular F G; Then from the point B, which is the fire, to draw another Parallel to the baſe until that it divide F G at the point H, and this point H ſhall be the foot of the light, as if the Torch were lying, by reaſon that its fire remaineth always at the point B.

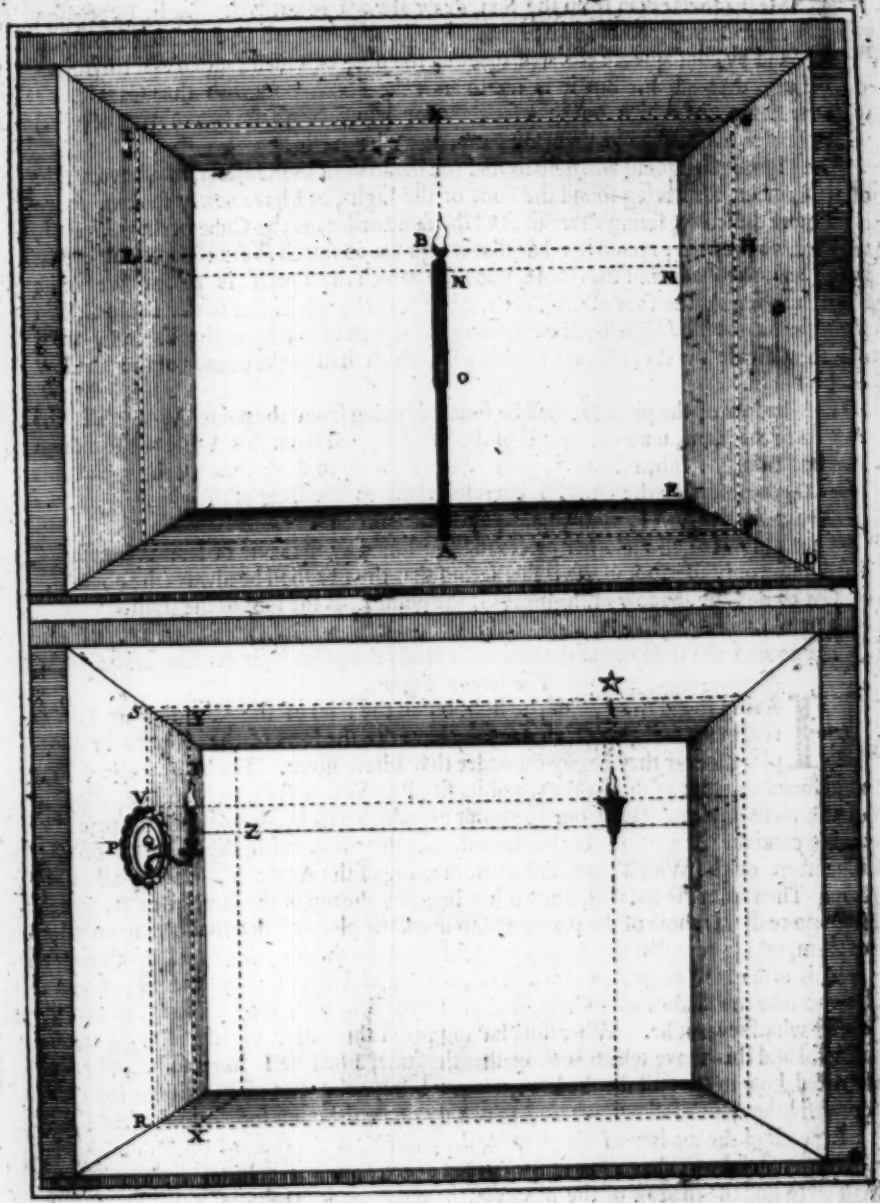
For to finde this foot of light at the Board above, we muſt from the point G draw a Parallel to the baſe as G I, and from the point B to make a Perpendicule to G I, which ſhall give the point K, which ſhall be the point of the foot of the light, as if the Torch were turned upſide down.

For to finde it on the other ſide of the Hall, we muſt make the ſame Order as on the ſide C, and we ſhall have the point L.

For to finde the foot of the light at the bottom of the Hall, we muſt from the point H draw to the point of ſight O, until that we divide the Perpendicule E at the point M; then from this point M to make a Parallel to the baſe, which ſhall divide the Torch at the point N, this point ſhall be the foot of the light for the bottom of the Hall.

The foot of the Candle is found by the ſame Order, as that of the Torch, taking the midſt of the foot of the Candleſtick for the foot of the light; but when it is a Plated Candleſtick, or an Arm ſet againſt a wall, it muſt be that the Arm or the Branch of the Candleſtick, determine the line, or ſhall be the foot of the light. For example, in the Plate P, we muſt by the branch Q draw a Perpendicular to the baſe, as R S; then from the fire T to make a ſmall Parallel to the baſe, which ſhall divide R S at the point V, which ſhall be the foot of the light for this ſide, the point X ſhall be it for the board below, the point Y for the board above, and Z for the bottom of the Hall or Chamber.

For the Lamp, it is the place where it is faſtned, which determineth its foot, as here *, from which place they draw a Parallel to the baſe unto the firſt Ray, and altogether the ſame as at the Torch, and at the Candle.



142

For to find the ſhadows by a Torch, on all the ſides of a Chamber,

THe ſhadows taken from the Sun, draw always towards the Earth, by reaſon that this Star, communicateth not its brightneſs except it be above our Horizon: and by conſequence elevated above all the objects, which cauſeth that their ſhadow always deſcendeth. But it is not ſo with the Torch, nor with the Candle, or with the Lamp, the which one may ſet above or below, or on the ſide of the objects, which rendreth their ſhadows on all parts, as we have ſaid.

The Figure aforegoing will help to find the ſhadows of the Objects, ſet on every ſide of a Chamber, for having found the Foot of the Light, as I have newly ſpoken, there is no more difficulty, ſeeing that this is all the ſame order, as the Cube of the 141 FO, whither we may have recourſe: but that we go not to ſearch ſo far: I ſhall ſay, that for to have the ſhadow of the Table, upon the which the Torch is paſſed we muſt from the point A, the foot of the Torch, draw Rays by all the feet of the Table C, then from the point of the light B, draw lines by the corners from upon the Table I, until that they divide the Rays C, at the points O, which ſhall be the bounds of the ſhadow of the Table.

The ſhadow of the piece D, ſhall be found drawing from the point A, by all the Angles of the plane, unto the Angle of the Wall E, and from this Angle to raiſe them Perpendicularly: Then from the point of the light B, to draw lines by the top of this piece D, by obſerving the Angles correſpondent to the lines of the plane, and we ſhall have the ſhadow F, of the figure, or of the piece D.

The ſhadows of all the other pieces ſhall be found by the ſame order: Wherefore I ſhall quote only the foot of the light, ſeeing that the fire ſhall be always the point B.

For to find the ſhadow of the piece G, the point L, is the foot of the light.

For to find the ſhadow of the piece N, the point H, is the foot of the light.

For to find the ſhadows of the pieces I and M, the point K, is the foot of the light.

The ſecond Figure.

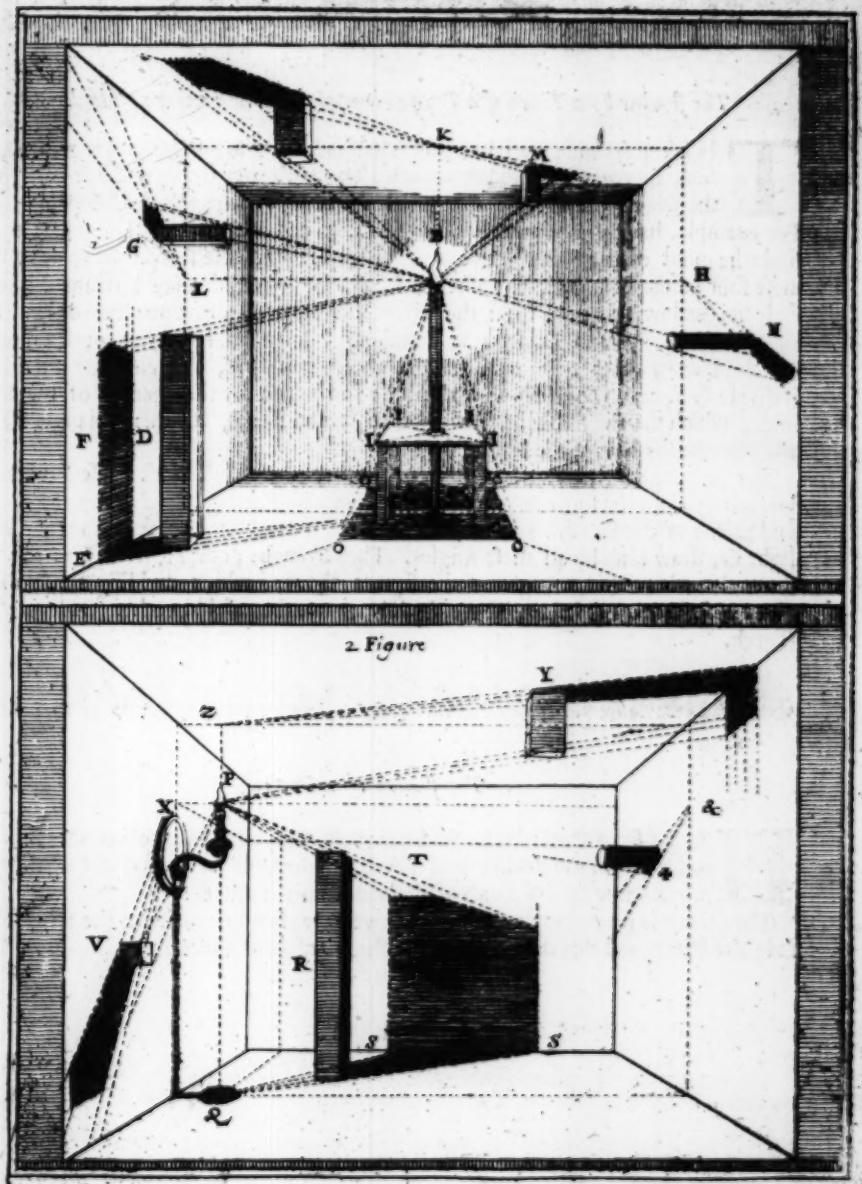
HAving found the foot of the light on all the ſides of the Chamber as I have ſaid in the foregoing leaf, one may have the ſhadows of the objects in what place ſoever they be, by the order that I have given. For by example, having found the foot of the light Q, and its fire P. We muſt for to have the ſhadow of the piece R, draw Rays from the point Q, which paſs by the plane of the peice R, and to continue them infinitely, but becauſe that they meet with the bottom of the Chamber, or the Wall T, we muſt at the meeting of the Angle S, elevate all theſe lines. Then from the point P, draw other lines, by the top of the ſame piece R, which ſhall go to divide thoſe of the plane, and to mark the place of the ſhadow upon each of them, taking care that the Angles have reference to the lines drawn on the plane.

This order is ſo general, and univerſal, that he which ſhall well underſtand only how to take the ſhadow of a Cube, ſhall find no difficulty to find the ſhadow of any object whatſoever it be. Wherefore having given this order of the Cube at the 141 fol and this above which is altogether the ſame, I believe I have ſufficiently inſtructed how to give all the ſhadows, without being obliged to uſe repetitions in all the other figures which follow, where I ſhall only quote the point for the foot of the light.

For to find the ſhadow of the piece V, the point X, is the foot of the light.

For to find the ſhadow of the piece Y, the point Z, is the foot of the light.

For to find the ſhadow of the piece [illegible], the point [illegible], is the foot of the light, and P, the fire or the light, for all the pieces of this ſecond Figure.


K
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2 Figure
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S
Q

The ſhadow by a Torch of a Pyramide upright, and another upſide down.

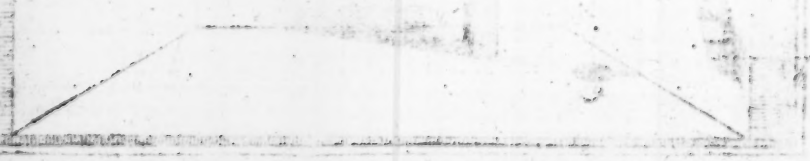
THIS Pyramide upright, giveth its ſhadow by a Torch, as if it were by the Sun, by reaſon that in the one and the other, there is but one line only, upon the which they determine a point, which is for the point of the Pyramide: For example, having made the Plane B C D E, and drawn two Diagonals for to finde the midſt of the Plane F, we muſt raiſe a Perpendicule F A, then to draw from theſe four points B C D E, to the point A, and the Pyramide ſhall be framed; for to finde its ſhadow, we muſt from the foot of the light G, draw one line only paſſing by the point F, and prolong it infinitely. Then from the fire or light of the Torch H, draw another line by the top of the Pyramide A, and continue it until that it divide G F, at the point I, which ſhall be the bound for the ſhadow of the Pyramide, which ſhall be finiſhed, drawing C to I, and E to I, for this Triangle C I E, ſhall be the ſhadow of the Pyramide A.

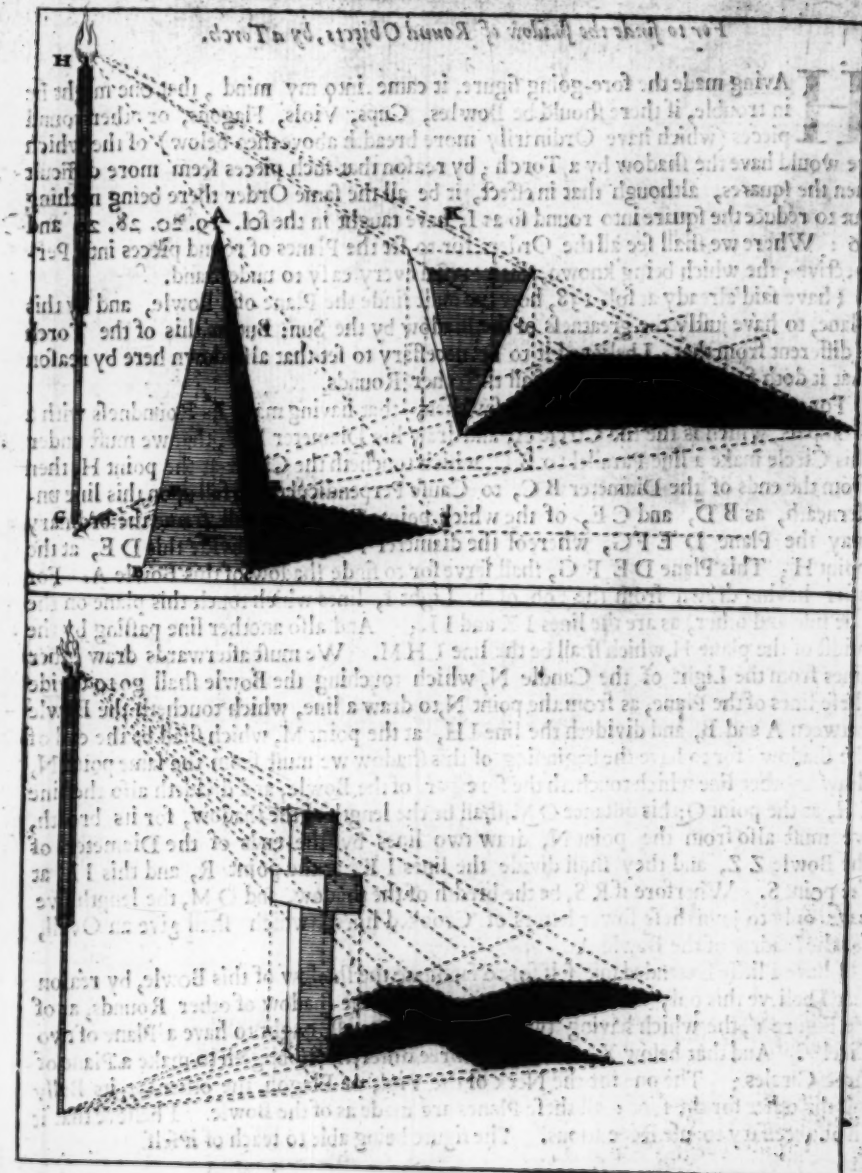
For to have the ſhadow of this Pyramide over-turn'd, we muſt cauſe Perpendiculars to fall from the ſquare above, and to frame the Plane below thereby, as we have ſaid at that of the Sun fol. 138. this Plane being framed, we muſt from the foot of the light G, draw lines by all theſe Angles, Then from the point H, which is the fire, draw alſo others by the Angles of the ſquare above, which dividing thoſe of the Plane, ſhall mark the place of the ſhadow as we have ſaid in other Orders of the Torch.

The ſhadow of a Croſs.

HAving ſet a Croſs in the ſhadows of the Sun, it ſeemed to me neceſſary alſo to ſet one in the ſhadow of a Torch, to the end that by that and by this, we might know the difference of the one from the other.

The Order is ſeen enough, ſeeing that we have already taught at the 137 fol. to finde the Plane, and that the reſt is as in other Orders of the Torch.





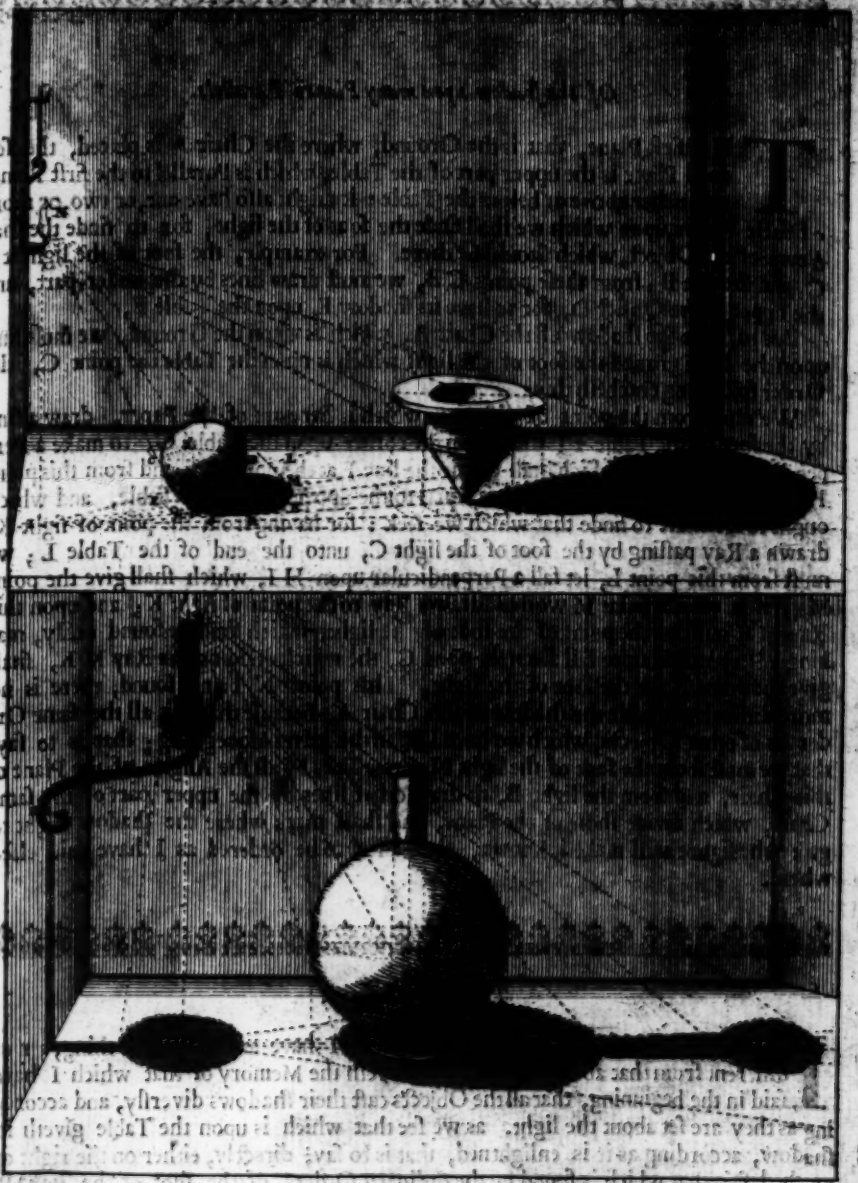
For to finde the ſhadow of Round Objects, by a Torch.

HAving made the fore-going figure, it came into my mind, that one might be in trouble, if there ſhould be Bowles, Cups, Viols, Flagons, or other round pieces (which have Ordinarily more breadth above then below) of the which we would have the ſhadow by a Torch; by reaſon that ſuch pieces ſeem more difficult then the ſquares, although that in effect, it be all the ſame Order there being nothing but to reduce the ſquare into round ſo as I, have taught in the fol. 19. 20. 28. 29 and 86: Where we ſhall ſee all the Orders for to ſet the Planes of round pieces into Perſpective; the which being known, all the reſt is very eaſy to underſtand.

I have ſaid already at fol. 138, how we muſt finde the Plane of a Bowle, and by this Plane, to have juſtly the greatneſs of the ſhadow by the Sun: But as this of the Torch is different from that, I believed it to be neceſſary to ſet that alſo down here by reaſon that it doth [illegible] of all the other Rounds.

For the [illegible] of this Bowle, I ſay then, that having made its Roundneſs with a Compaſs, which is the the Circle A, and draw his Diameter B C, that we muſt under this Circle make a line Parallel to B C, which toucheth the Circle at the point H, then from the ends of the Diameter B C, to Cauſe Perpendiculars to fall upon this line underneath, as B D, and C E, of the which points D E [illegible] ſhall frame the ordinary way the Plane D E F G, whereof the diameter [illegible] divide this D E, at the point H; This Plane D E F G, ſhall ſerve for to finde ſhadow of this Bowle A. For after having drawn from the Foot of the Light I, lines which touch this plane on the one ſide and other, as are the lines I K and I L; And alſo another line paſſing by the midſt of the plane H, which ſhall be the line I H M. We muſt afterwards draw other lines from the Light of the Candle N, which touching the Bowle ſhall go to divide theſe lines of the Plane, as from the point N, to draw a line, which toucheth the Bowle between A and B, and divideth the line I H, at the point M, which ſhall be the end of the ſhadow: for to have the beginning of this ſhadow we muſt from the ſame point N, draw another line which toucheth the fore-part of the Bowle, and divideth alſo the line I H, at the point Q: this diſtance Q M, ſhall be the length of the ſhadow, for its bredth, we muſt alſo from the point N, draw two lines by the ends of the Diameter of the Bowle Z Z, and they ſhall divide the lines I K, at the point R, and this I L, at the point S. Wherfore if R S, be the bredth of the ſhadow, and Q M, the length, we have only to joyn theſe fower letters of Crooked lines, which ſhall give an Ovall, for the ſhadrw of the Bowle A

I have a little Extended my ſelf for to facilitate the ſhadow of this Bowle, by reaſon that I believe this only Order ſufficient for to [illegible] the ſhadow of other Rounds, as of the Figure V, the which having two [illegible] ought to have a Plane of two Circles. And that below X, which has three differences, obligeth to make a Plane of three Circles; The one for the Neck of the Viol, or Flagon, the other for its Belly and the other for the foot: all theſe Planes are made as of the Bowle. I believe that it not neceſſary to uſe Repetitions. The figure being able to teach of it ſelf.



Of the ſhadow upon many Planes. Parallels.

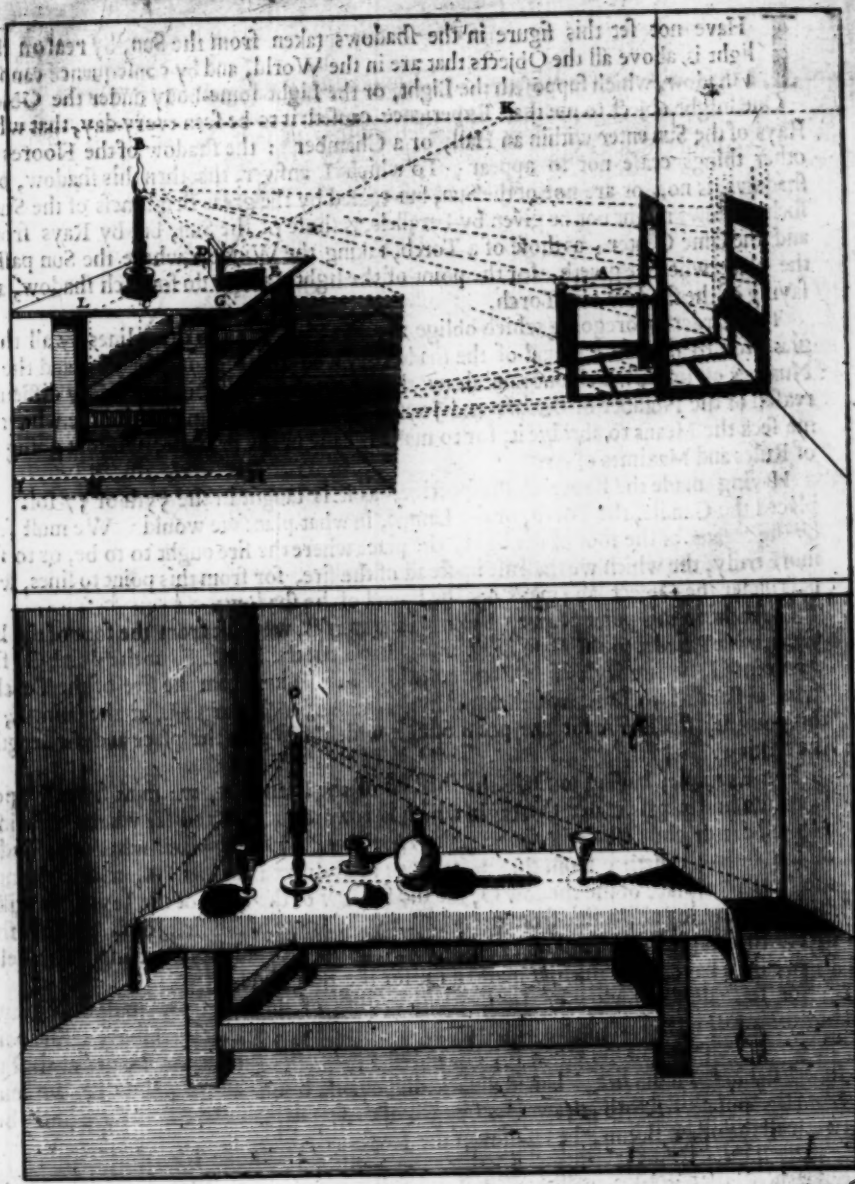
THE firſt Plane, that is the Ground, where the Chair A is placed, the ſecond Plane is the upper part of the Table, which is Parallel to the firſt Plane, and either above or below the Table: it might alſo have one, or two, or more of theſe Planes, upon which we ſhall finde the foot of the light; for to finde the ſhadow of the Object, which ſhould be there. For example, the foot of the light it is C, and the fire B; from theſe points C B, we muſt draw lines by the under-part, and the upper of the Object D, for to have its ſhadow E, upon the Table E.

But to have the ſhadow of the Chair A, which is upon the Ground, we muſt find upon the ſame ground the foot of the light which is upon the Table the point C, the Order following teacheth this.

We muſt from the point of diſtance, which is here out of the Paper, draw a line by the foot of the Table F; then from the corner upon the Table G, to make a Perpendicular G to fall, which ſhall divide the line F at the point H, and from this point H to draw a Parallel H I, which is equal to the upper part of the Table, and which ought to be obſerved to finde that which we ſeek: for having from the point of ſight K, drawn a Ray paſſing by the foot of the light C, unto the end of the Table L; we muſt from this point L, let fall a Perpendicular upon H I, which ſhall give the point M; from which point M we muſt draw a Ray to the point of ſight K; and upon this Ray M K muſt be the point of the foot of the light, which ſhall be found eaſily, making a Perpendicular to fall from the point C, the which dividing the Ray M K, ſhall give the point N for the foot of the light. This point N being found, there is no more difficulty to finde the ſhadow of this Chair A, becauſe that it is all the ſame Order as of other Objects, which we have ſeen in the leaves aforegoing; that is to ſay, that we muſt from the foot of the light N, draw lines by all the Angles of the Plane of this Chair, and from the light B, to draw other lines by the upper part of the ſame Chair, which divide thoſe of the Plane, and ſhall mark where the ſhadow ought to go: the figure will make it known, that all is to be ordered as I have ſaid elſewhere.

The ſecond Figure.

I Do not ſet down this ſecond Figure, for that I have any particular thing, nor different from that above, but only to refreſh the Memory of that which I have ſaid in the beginning, that all the Objects caſt their ſhadows diverſly, and according as they are ſet about the light, as we ſee that which is upon the Table giveth its ſhadow, according as it is enlightned, that is to ſay, directly, either on the right or on the left: that which is found by the ordinary Orders of the foot of the light P, and of its fire or light O, the moſt part of theſe Objects are broader above then below, wherefore we muſt make their Planes, as I have ſaid in thoſe folio's where I have ſpoken of the like figures.



The ſhadow of boarded Floores by a Torch.

I Have not ſet this figure in the ſhadows taken from the Sun, by reaſon that this light is above all the Objects that are in the World, and by conſequence cannot give a ſhadow, which ſuppoſeth the Light, or the Light-ſome-body under the Object.

One might object to me that Experience cauſeth it to be ſeen every day, that when the Rays of the Sun enter within an Hall, or a Chamber : the ſhadow of the Floores and of other things ceaſe not to appear ; To which I anſwer, that then this ſhadow, or theſe ſhadows, is not, or are not of the Sun, but cauſed by the great Brigheneſs of the Sun ; and ſuch ſhadows might not be given by Parallels, as thoſe of the Sun, but by Rays from one and the ſame Center ; as thoſe of a Torch, taking the Window where the Sun paſſeth, or the place where it giveth, for the point of the light, and ſo do for ſuch ſhadow, as I am ſaying of the ſhadow of a Torch.

The Orders aforegoing which oblige to make Planes and to draw lines by all the Angles, for to finde the bound of the ſhadows, would be too long for this, and the great Number of lines, which one muſt draw there, would make this figure very difficult, by reaſon of the Number of Beames and Joyſts which there are met with : the which made me ſeek the Means to abridge it, for to make is eaſie in the practiſe, without going forth of Rules and Maximes of Art

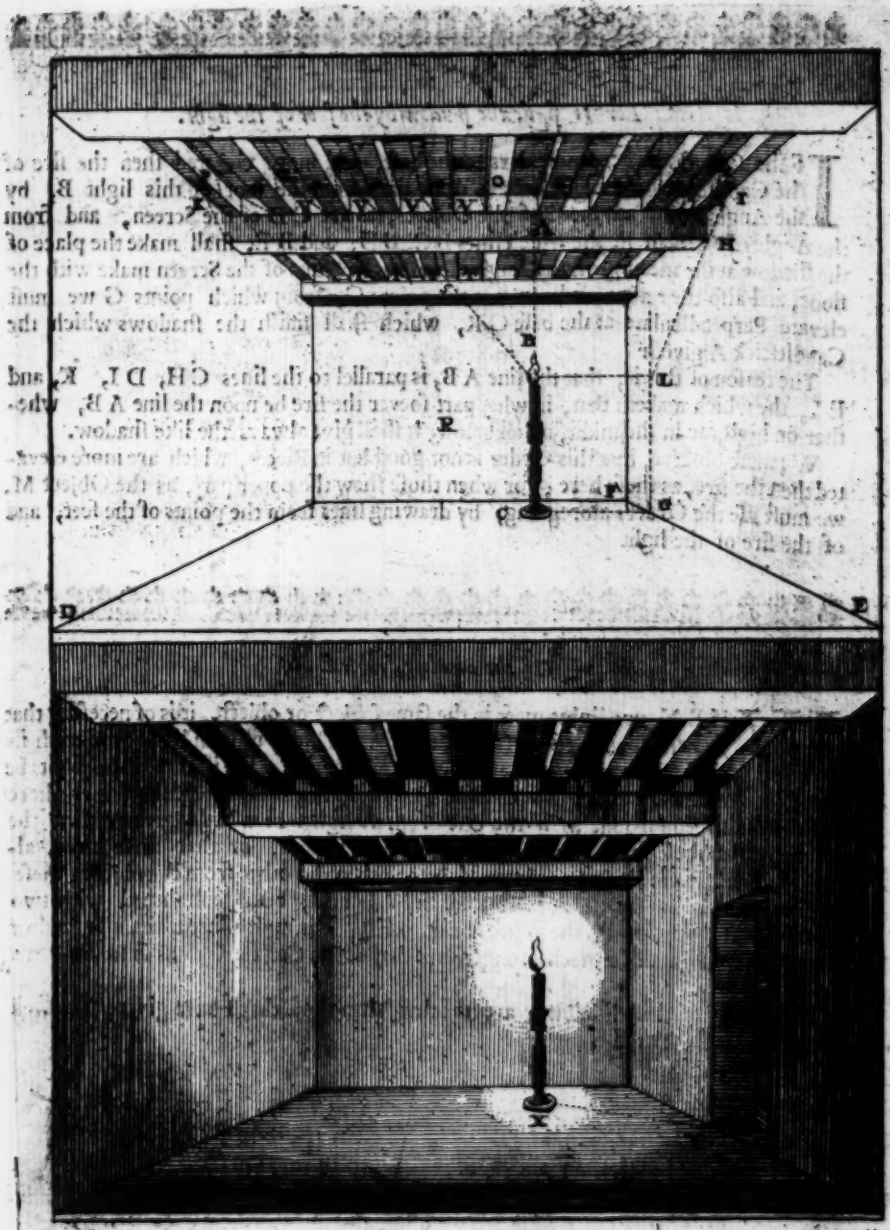
Having made the floore in Perſpective, as it is taught in the 55th or 57 fol. And placed the Candle, the Torch, or the Lampe, in what place we would. We muſt ſearch by the means of the foot of the light, the place where the fire ought to to be, or to ſpeak more truly, the which we ſhall uſe in ſtead of the fire, for from this point to lines, which paſs under the Object, and mark out the bound of the ſhadows.

For to have this point of fire, the light being at B, we muſt from the foot of the light C, draw a Parallel to the Baſe D E, untill that it cut the Ray E F, at the point G, from this point G, we muſt elevate a Perpendicule G L. Then from the fire of the Torch B, draw a Parallel to D E, which ſhall divide the Perpendicular G L, at the point L, and this point L, ſhall ſerve for the point of fire, which ſhall give the place and the length of the ſhadow.

For Example, having to finde the ſhadow of the Beame A, we muſt from the point L, make a line to paſs under the Angle which is towards us as H, and ſee where this line L H, ſhall divide the firſt Joyſt, at the point I, for this ſhall be the place where the ſhadow of the Beame endeth ; from this point I, we muſt draw a parallel I K, and marke upon the Joyſts the place of the ſhadow O, for the ſhadow of the ſpace of the Joyſts, it will be found by drawing alſo a line from the point L, by the Angle of the firſt Joyſt M, which ſhall divide the Angle of the Hollow at the point N, from this point N, making a Parallel N P, we ſhall have all the ſhadow marked Q, for the Beame A.

For to finde the ſhadow of Joyſts, beſides that of the Beame, we muſt only draw a line of fire B, by the Angle S, untill that it divide the Bottome of the Floore at the point T, do the ſame to all the other Joyſts, and you ſhall finde the ſhadow longer at the farther diſtance from the fire. Having marked upon one Beame all the points T, we muſt from the point of ſight R, draw lines by each of theſe points, and we ſhall have juſtly between all the other Beams, the ſhadow of the Joyſts as is to be ſeen at the points V.

The figure below is the ſame with that above, with this difference, that this is ſhadowed and that the former is not, by reaſon that the ſhadow would have hindred to ſee the letters and the ſmall lines. There is more in this, the ſhadow of the Iawmbs of this Gate, which muſt be taken from the foot of the light as is to be ſeen in X and Y.



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For to finde the ſhadow by the foot of the light.

IF the Objects be Perpendiculars to the baſe, and more elevated then the fire of the Candle A. We ought only to draw lines from the foot of this light B, by the Angles moſt advanced of the Objects, as are C D of the Screen, and from the Angle of the wall E, the which lines B C, B D, and B E, ſhall make the place of the ſhadow at the meeting of the Angles, which the Shuts of the Screen make with the floor, and alſo the return of the wall at the points G, from which points G we muſt elevate Perpendiculars at the baſe G R, which ſhall finiſh the ſhadows which the Candleſtick A giveth

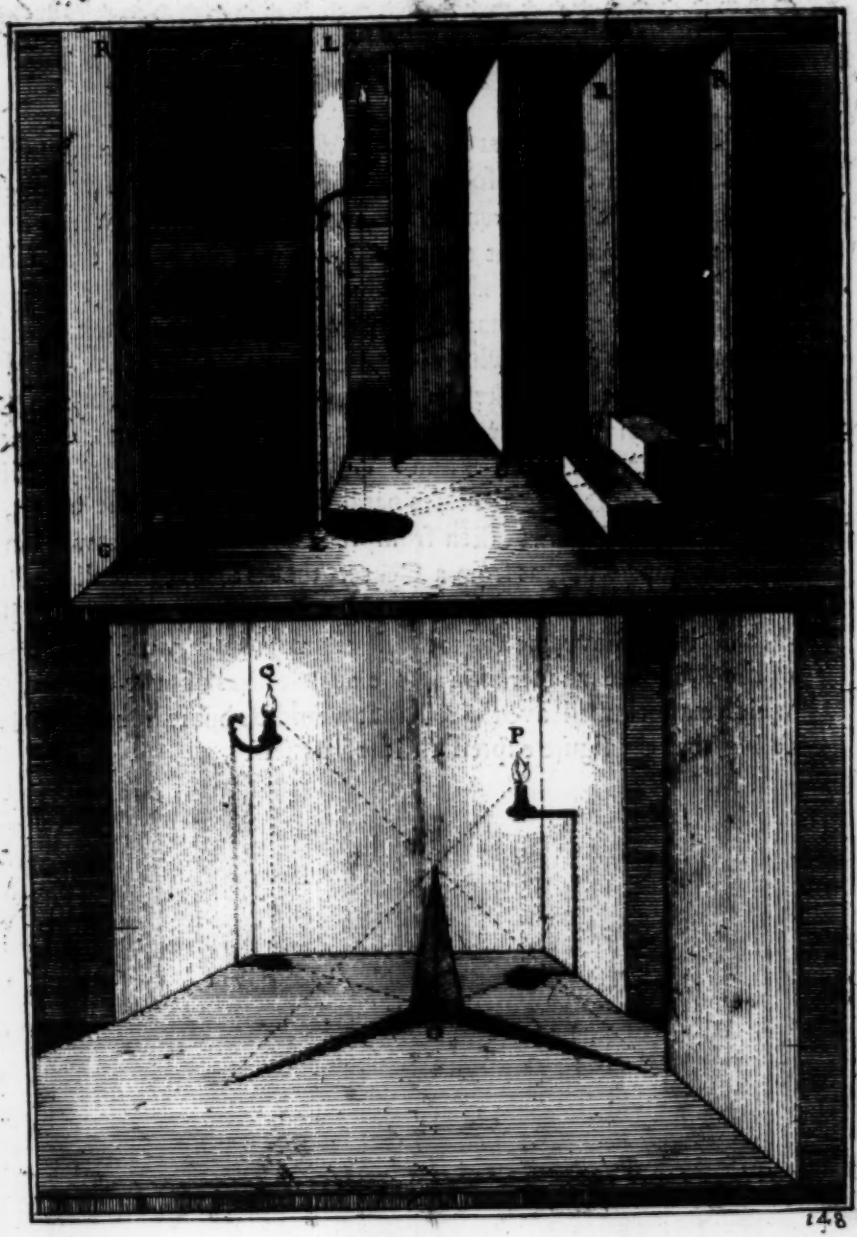
The reaſon of this is, that the line A B, is parallel to the lines C H, D I, K, and E L, the which maketh that, in what part ſoever the fire be upon the line A B, whether on high, or in the midſt, or all below, it ſhall give always the like ſhadow.

We muſt obſerve, that this Order is not good but in Pieces, which are more elevated then the fire, as theſe here; for when thoſe ſhew the upper part, as the Object M, we muſt uſe the Orders aforegoing, by drawing lines from the points of the feet, and of the fire of the light

Of the Shadow doubled.

WHEN two lights meet in the ſame ſubject or object, it is of neceſſity that two ſhadows meet there, becauſe that each day or each light produceth its own with proportion, I ſay, with proportion; for if theſe Fires lights be equal, at the ſame diſtance; It is certain that the ſhadows ſhall be equal; but if there be the leaſt diſproportion, as if the one of theſe lights be a little greater then the other, or that theſe fires be a little greater then the other, or that theſe fires, although equal, be more or leſs advanced the one then the other from the object; theſe ſhadows ſhall be different; for example, the object O, being enlightned with two Candles; the one near P, the other farther off Q; it is moſt aſſured, that the ſhadow of the Candle P, ſhall be much ſtronger then that of the Candle Q, as is to be ſeen in the figure.

The Orders of theſe ſhadows, are no other, then thoſe that I have given, as well for the Sun as the Torch



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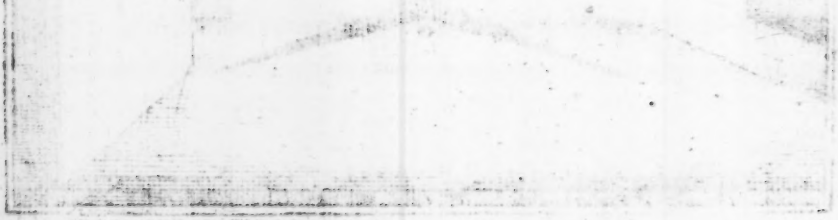
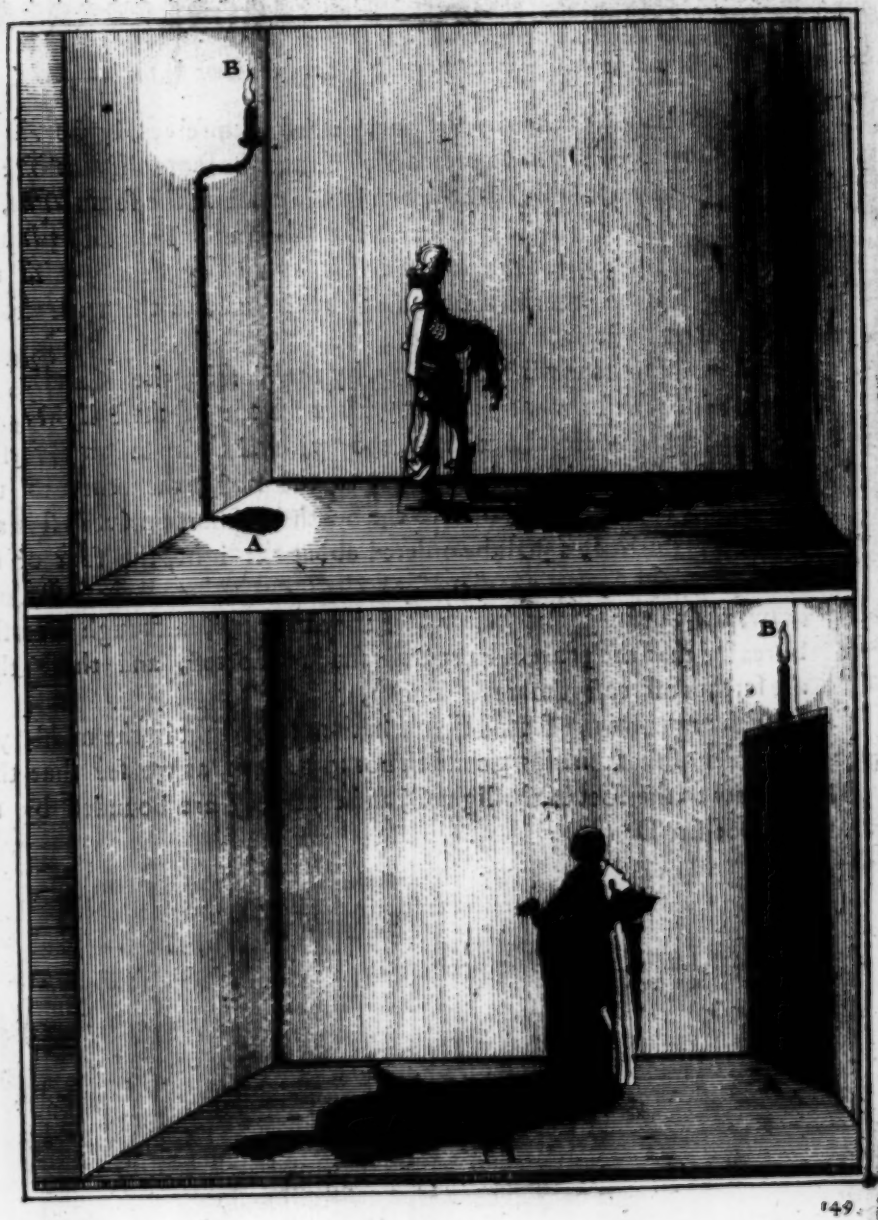
For the Shadow of Figures by a Torch

IT is to be believed, that my counſel will be followed that one ſhould not turn over the leaf for to learn the order which followeth, before they underſtand and remember well, that which went before Wherefore ſuppoſing that one underſtands well the order, that I have given at 139 fol. for to find the ſhadow by the Sun, for all the figures of ſuch poſtures as they may be: I have nothing to ſay for theſe, ſeeing that the line below, which I make to ſerve for the plane, and all the other meaſures are taken in one, as in the other. But becauſe that the Torch doth not render an equal ſhadow in breadth to the body that giveth its ſhape, as doth the Sun: We muſt take this advice, which is, that inſtead of drawing the lines parallels, that one to the other, as they are in the ſhadows taken from the Sun, we muſt draw them all from the ſame point, as from a Center; that is to ſay, that all the lines, which are drawn by the plane, muſt be drawn from the foot of the light A, and thoſe above, and about the figure muſt be drawn from the point of fire B, in like manner as in all the other orders of the Torch, the which maketh me leave the reſt, that would be but tedious repetitions, ſeeing that the figure expreſſeth it of its ſelf.





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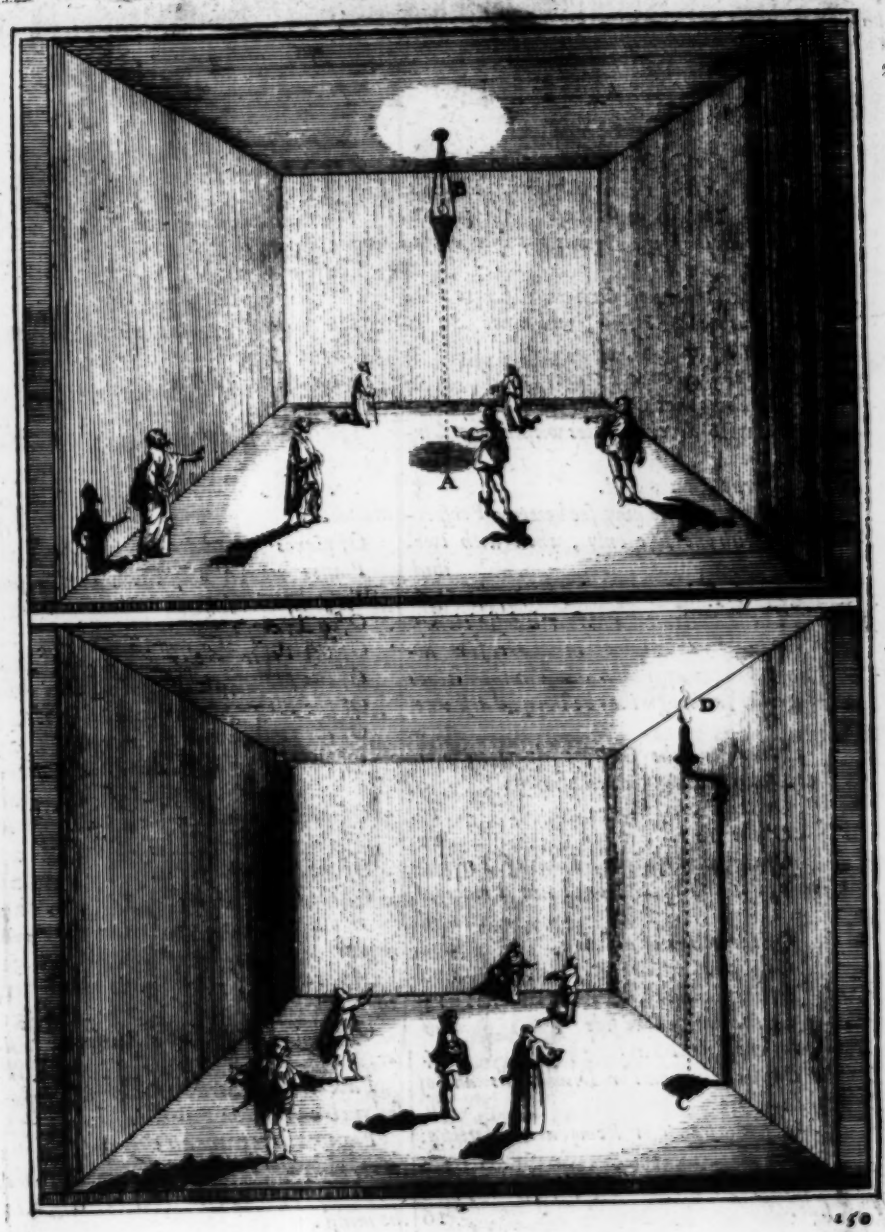
Of the divers diſpoſitions and heights of ſhadows by the Torch.

THe ſhadows taken by the Sun, do caſt themſelves always on the ſame ſide, and have ordinarily one and the ſame diſpoſition: it being impoſſible that the Sun ſhould cauſe at the ſame time, to caſt the ſhadow of one body towards the Weſt, and of another towards the Eaſt, it is very true that it doth this every day, the one in the morning, and the other in the evening, but in one and the ſame hour, it will never do it naturally.

The which is done without failing, by the Torch, the Candle, or the Lamp: for in what place ſoever you ſet one of theſe lights, if there be many bodies about them, they will caſt their ſhadow diverſly, that is to ſay, that the one will caſt it to the Eaſt, the other to the Weſt, this to the North, that to the South: in ſhort on every ſide according as the bodies ſhall be ordered about the light, the foot of the which marked A, ſerveth them for a Center, whether all theſe ſhadows draw, and the fire B, marketh where they muſt end, although diverſly, by reaſon that the neareſt, have their ſhadow ſhorteſt, and thoſe that are farther off, caſt it more at length,

Although that the ſecond figure hath not the light in the midſt, yet the order of theſe ſhadows ceaſeth not to be kept, as we ſee that they all draw to the foot of the light C, and that they are bounded by the point of fire D.



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